Third Special Report
to the U. S. Congress on

Alcohol and Health

from the Secretary of Health,
Education, and Welfare

JUNE 1978

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Alcohol, Drug Abuse, and Mental Health Administration
National Institute on Alcohol Abuse and Alcoholism

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Ernest P. Noble, Ph.D., M.D.
Editor

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The First Special Report to the Congress on Alcohol and Health (1971) broadly described historical and contemporary alcohol uses and abuses, the causes of alcoholism, and treatment methods. Effects of alcohol on the nervous system, and the legal status of intoxication and alcoholism were discussed in detail.

The Second Special Report on Alcohol and Health (1974) focused on the advances in knowledge gained in the interim between the two reports and supplemented the first volume with discussions of health consequences and of alcohol use among adults, young people, and the elderly.

This Third Special Report on Alcohol and Health incorporates the most significant findings of recent research in the field of alcoholism. The findings are described in extensive detail in the Technical Report in Support of the Third Special Report on Alcohol and Health. The latter, to be published separately by the National Institute on Alcohol Abuse and Alcoholism, will be appropriate for those seeking references, as well as for additional data and discussion.

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Foreword

During the past several years, we have witnessed a dramatic increase in the focus on the quality of life in this country. More and more Americans have begun to concern themselves with the safety of the products they buy, the purity of the air they breathe and the water they drink, the efficacy of the medicines they use, and the healthfulness of the food they consume. Many individuals have changed their personal dietary and exercise habits to improve physical and mental health.

However, these new directions are not yet the national norm. In our highly social and competitive society, stress often takes its toll. And one substance above all others is used to relieve tension and encourage sociability: alcohol. Although most people who drink do so without any noticeable detrimental effects, there are 10 million Americans whose excessive drinking endangers their own health, the happiness of their families, and the well-being of their fellow citizens.

Although the research that is discussed in detail in this Third Special Report to the Congress on Alcohol and Health has increased our understanding in this area measurably, there is much we still do not know. Alcoholism is an extremely complex and pervasive problem, involving physiological, psychological, cultural, and even economic factors. Moreover, it is the kind of root problem that impacts on many other areas of national concern—from traffic safety to child abuse. Continued research is essential not only for a better understanding of the processes leading to alcoholism, but also to enable us to provide better treatment and more effective approaches to prevention. The scope of our commitment within the Department of Health, Education, and Welfare is evidenced in this report, which encompasses not only the biomedical and psychosocial aspects of alcoholism, but also such practical, everyday considerations as the financing of treatment services for the affected individual.

Despite the significant beginning we have made in recent years in raising public awareness of alcohol problems, societal attitudes still play a significant role in discouraging people in trouble with alcohol from seeking early treatment. And while people increasingly are accepting alcoholism as the treatable illness that it is, there is still stigma attached to being an alcoholic. The Federal Government, through the National Institute on Alcohol Abuse and Alcoholism, has undertaken a major commitment to address the needs of problem drinkers and to encourage an atmosphere conducive to treatment. This report reflects significant advances in the delivery of services to greater numbers of alcoholics.

I am hopeful that the trend towards increased emphasis on personal health and environmental concerns will favorably influence our drinking patterns in the future. It is not an easy task to reduce substantially the enormous costs to our society caused by alcoholism, but it is one that all of us must address. The alcoholic beverage industry could make a substantial contribution by examining its current policies and procedures. Self-regulation to lessen the potential ill effects of marketing strategies on youth is one way the industry could evidence its willingness to become even more responsible. States and local communities should be encouraged to reexamine their policies regarding alcohol availability as affected by licensing, age limits, taxes, prices, and related influences.

The problem of alcohol abuse and alcoholism deserves the concern of every citizen. I am therefore pleased to present this report to Congress as another step in our continuing national effort to combat this illness that damages the lives of millions of Americans daily.

Joseph A. Califano, Jr.
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Highlights

Chapter I. Alcohol Use And Alcohol-Related Problems

- Increased availability of alcoholic beverages has occurred as a result of the lowering of the drinking age in several States, a trend to longer hours of sale, and an increase in the number of retail outlets.

- Since 1971, per capita alcohol consumption in the United States has been the highest since 1850, ranging from 2.63 to 2.69 gallons of absolute ethanol per person 14 years and older. During the 1970's, there has been little change in total per capita alcohol consumption.

- There are an estimated 9.3 to 10 million problem drinkers (including alcoholics) in the adult population—7 percent of the 145 million adults (18 years and over).

- Of adults who drink, 36 percent can be classified as either being problem drinkers or having potential problems with alcohol (10 percent and 26 percent, respectively). Similar to consumption patterns, combined rates of problem drinkers and those having potential alcohol problems are substantially less for women (27 percent) than for men (44 percent).

- In addition to adult problem drinkers, there are an estimated 3.3 million problem drinkers among youth in the 14 to 17 age range—19 percent of the 17 million persons in this age group. (Youth problem drinking is defined differently than for adults because youth problems tend to be acute rather than chronic.)

- The concern over increased alcohol consumption in youth is heightened by the observation that early drinking behavior predicts drinking habits in later life. Specifically, a recent study showed that those who were problem drinkers in college were most likely to be problem drinkers and least likely to be abstainers 25 years later.

- The rate of total cirrhosis deaths increased by 36.6 percent from 1960 to 1970, followed by a gradual leveling during the early 1970's and a decrease of 6.3 percent from 1974 to 1975. Even though this decrease is encouraging, liver cirrhosis still ranked as the sixth most common cause of death in the United States in 1975, with up to 95 percent of the cases estimated to be alcohol related.

- It is estimated that alcohol-related deaths may run as high as 205,000 per year (11 percent of the 1.9 million deaths in 1975). In fact, clinical studies consistently show that various types of alcohol problems in males are associated with mortality rates two to six times higher than rates in the general population.

- Studies of international alcohol statistics demonstrate a high correlation between the per capita level of consumption and the rate of cirrhosis deaths. Preliminary results from a recent study also show that alcohol taxes and prices are related negatively to alcohol consumption.

- Alcohol abuse and alcoholism cost the United States nearly $43 billion in 1975—including $19.64 billion in lost production, $12.74 billion in health and medical costs, $5.14 billion in motor vehicle accidents, $2.86 billion in violent crimes, $1.94 billion in social responses, and $0.43 billion in fire losses.

Chapter II. Special Population Groups

- The characteristics that distinguish special population groups from the dominant culture and from each other also frequently are involved in the development of alcohol use and abuse among those groups. For this reason,

youth, women, the elderly, the Spanish-speaking, American Indians, and black Americans, among others, should be considered discrete sociocultural units with unique needs for prevention and treatment.

- Since World War II, alcohol consumption among youth increased steadily to a level of 70 percent in 1965 and has not changed substantially since then. Teenagers typically have their first drink at age 13 with girls now trying alcohol almost as often as boys during the teen years.

- Results from analysis of a 1974 survey of high school students showed that problem drinking increases from 5 percent in the 7th grade to 40 percent in the 12th grade for boys, and from 4 percent in the 7th grade to 21 percent in the 12th grade for girls. The proportion of high school students who reported ever having been drunk increased dramatically from 19 percent before 1966 to 45 percent between 1966 and 1975. The proportion reporting being intoxicated at least once a month rose from 10 percent before 1966 to 19 percent between 1966 and 1975.

- Conservative estimates of the number of adult women with alcohol problems range from 1.5 million to 2.25 million. Among women, social factors are predictive of drinking practices. For example, under age 35, those who are divorced or separated have the highest incidence of heavier and problem drinking. Among married women under 65, those who are working have higher rates of heavier and problem drinking than those who are not employed outside the home, regardless of socioeconomic status. Women who are not employed and who have drinking difficulties remain overlooked by society.

- Although both drinking and problem drinking among the elderly are less prevalent than in younger populations, a significant number of people 60 years and older have problems with alcohol. Up to 10 percent of the general elderly male population are problem drinkers, and approximately 10 percent of alcoholics in treatment are 60 or older. In contrast, only 2 percent of the elderly female population are heavy or problem drinkers. Failure to diagnose drinking problems is the greatest barrier to treatment of senior citizens.

- Among all special population groups in the United States, American Indians have the highest reported frequency of problems associated with drinking. The cultural and traditional norms that have reinforced Indian drinking patterns also have served as barriers to treatment.

- The extent of problem drinking tends to be greater among the Spanish-speaking population than among the general population. Acculturation stress may be partly to blame for high rates of alcoholism. Spanish-speaking people seek treatment less often than do individuals in the general population, partly because of cultural and environmental factors.

- A smaller proportion of black females than white females drink alcohol, but those black females who do drink have a greater proportion of heavier drinkers. Among black males, the rates of both drinking and heavier drinking are slightly less than for white males.

Chapter III. Biomedical Consequences of Alcohol Use and Abuse

- Alcohol has a pervasive effect on the body from its point of entry through the gastrointestinal tract, the liver, and throughout the bloodstream. The brain and nervous system, heart, muscles, and endocrine system are also affected.

- Alcohol is associated with cardiomyopathy, a disease of the heart muscle. Diseases of the coronary arteries, such as angina pectoris and myocardial infarction, increase with heavy alcohol consumption. However, some epidemiologic data suggest that the risk for coronary artery disease may be smaller in light drinkers than in abstainers.

- Atrial fibrillation is seen most commonly in what is emerging as the "holiday heart syndrome," a cardiac arrhythmia noted in individuals free of overt heart disease who appear in emergency rooms after drinking weekends or near holidays associated with high alcohol consumption.

- Researchers are attempting to develop amethystic (sobering) agents that could abort or mitigate alcohol's depression of central nervous system functions by counteracting the acute effects of alcohol intoxication. Amethystic agents would be important in treating medical emergencies caused by an overdose of alcohol.

- Indisputably, alcohol is one cause of cancer. Drinking alcoholic beverages exposes the drinker to an increase in the risk of cancer at various sites in the body.

  -Heavy drinking increases the risk of developing cancer of the tongue, mouth, oropharynx, hypopharynx, esophagus, larynx, and liver. In the United States, these sites represent 6.1 to 9.1 percent of all cancers in the white population and 11.3 to 12.5 percent among blacks.

  -Alcohol has a synergistic effect with tobacco that increases the risk of cancer. For example, one study showed that the risk of head and neck cancers for heavy drinkers who smoked was 6 to 15 times greater than for those who abstain from both. Another study showed a risk of esophageal cancer 44 times greater for heavier users of both alcohol and tobacco, as compared to 18 times greater for heavier users of alcohol only and 5 times greater for heavier users of tobacco only.

  -Although rare in North America and Europe, primary liver cancer often is associated with cirrhosis, which nearly always is associated with alcohol consumption. A series of studies revealed that from 64 to 90 percent of the victims of either condition had suffered from both.

- As understanding of the metabolic, physiologic, and morphologic effects of alcohol increases, specific tests to determine alcohol abuse may be developed based on the altered functioning of various systems throughout the body.

Chapter IV. The Fetal Alcohol Syndrome and Other Effects on Offspring

- Research on the impact of maternal alcohol consumption on human infants has demonstrated that the fetal alcohol syndrome (FAS) is a clinically observable abnormality.

- Prospective studies are underway to determine the incidence of the FAS, the range of symptoms, the relationship between anomalies and amount of alcohol consumed, and other maternal risk factors. Three major epidemiologic studies on maternal alcohol consumption and infant outcome funded by NIAAA are in progress in the United States.

- A high blood alcohol level during a critical time of embryonic development probably is necessary to produce the FAS. The average alcohol consumption may not be as important as the maximum concentrations obtained during binge drinking at critical periods.

- Undoubtedly, there are many more cases in which only part of the syndrome is found. These may be instances of single malformations, retarded growth and development, or behavioral patterns such as jitteriness without the full syndrome. Such individuals may constitute a component of the large population diagnosed as exhibiting minimal brain dysfunction.

- The evidence from animal studies is quite compelling and clearly suggests a risk for human infants when daily alcohol consumption is 3 ounces (six drinks) or more of alcohol. Further animal experimentation and human prospective studies will be required to determine the risk from lower doses of alcohol.

- Observations of alcohol's effects on physiology and metabolism, particularly as related to the central nervous system, support the view that placental alcohol exposure may impair morphologic and neurologic fetal development.

- Brain lesions may occur in individuals who do not show other features of the FAS. Common neuropathologic findings are widespread malformations resulting from failure of the brain cells to migrate to their proper location.

- The projected incidence of the fetal alcohol syndrome makes it the third leading cause of birth defects with associated mental retardation— following only Down's Syndrome and spina bifida—and the only one of the three that is preventable.

Chapter V. Interaction of Alcohol and Other Drugs

- Despite the known ill effects of combining alcohol with other drugs, combined use abounds and has grown during the last three decades as Americans have increased their use of all types of drugs—prescription, over-the-counter, and illicit. This is the first time that the available research information has been included in the Special Report to the Congress on Alcohol and Health. The research results show that combined use can both increase physiologic danger and cause substantial behavioral change.

- Drinkers are especially likely to use psychoactive substances nonmedically. Among adults who have used marihuana, more than one-fourth have combined it with alcohol; similarly, one-fifth of all cocaine users have combined its use with alcohol. The prevalence of combined use is greatest among regular or more frequent users of drugs or alcohol.

- Nationally, alcohol in combination with other drugs is the second most frequent cause of drug-related medical crises. The minor tranquilizers are the drugs most frequently combined with alcohol and can increase the deleterious effects of alcohol on performance skills and alertness. In combination with alcohol, some of these tranquilizers can fatally depress cardiac functioning and respiration.

- Combined use of alcohol and other drugs frequently has supra-additive effects. These effects can be medically hazardous and occasionally are fatal. Impaired ability during performance of tasks such as driving is also dangerous, especially when the hazards are not recognized.

- A wide variety of drugs, not limited to psychoactive agents, can interact with even small amounts of alcohol. In addition, chronic or heavy use of alcohol can result in altered responsiveness to the effects of other drugs and vice versa.

Chapter VI. Psychological Effects of Alcohol

- Alcohol impairs the visual functions of glare recovery, light adaptation, detection of objects in the peripheral visual field, and visual search. These detrimental effects of alcohol are particularly hazardous for the intoxicated driver.

- Performance on tracking tasks such as those required by automobile drivers or airplane pilots is decreased significantly at low blood alcohol levels.

- Memory is strongly affected by alcohol. Information learned by a person who has been drinking is not remembered as well as if the person had been sober. This detrimental effect of alcohol often goes unnoticed by the drinker.

- Prolonged heavy drinking is associated with a number of neuropsychological deficits. In alcoholics, a direct relationship has been found between years of alcoholism and cognitive deficits.

- Recent evidence suggests that social drinking impairs sober intellectual capacities. When tested on cognitive tasks in the sober state, people who reported drinking more alcohol had poorer performance than lighter drinkers.

- Experiments show that social drinkers consume more alcohol in stressful situations where they feel their self-esteem is threatened.

- Studies on aggression and alcohol are important for understanding alcohol-related violence. For example, research has indicated that when male social drinkers drank in a competitive group situation, interpersonal aggression increased significantly.

Chapter VII. Genetic and Family Factors Relating to Alcoholism

- Assessing the relative importance of heredity and environment is difficult. Although studies suggest that genetic factors are involved, they provide no details on how a predisposition to

alcoholism is transmitted. However, adoption studies involving genetic factors related to alcoholism suggest that male children of alcoholic parents are more likely to have a drinking problem whether or not any contact with the alcoholic parent occurred.

- Family studies also provide evidence that the risk of alcoholism is increased by childhood conditions that impair or disrupt the emotional bonds between parent and child.

- Family research traditionally has focused on the wife of the alcoholic because fewer women than men are alcoholics. However, as public awareness of alcoholism among women increases, research attention increasingly is being placed on the alcoholic wife, her husband, and her children.

- Among couples whose treatment outcome was predictably poor, the wives of alcoholics gave and received little affection and used few socially desirable phrases to describe their husbands' sober behavior. For their part, the husbands expected few positive descriptions and participated little in family tasks. Both spouses expressed pessimistic opinions about the future of the marriage.

- Many therapists have begun to treat the whole family rather than the individual when alcoholism is present, although additional research on the efficacy of this approach is needed.

Chapter VIII. Alcohol-Related Accidents, Crime, and Violence

- Alcohol is significantly involved in motor vehicle accidents; home, industrial, and recreational accidents; crime; suicide; and family abuse. Accidents and violence play an especially prominent role in death and injury among the younger age groups.

- Half of all traffic fatalities and one-third of all traffic injuries are alcohol related, according to current estimates.

- Drinking by drivers plays a greater role as the severity of the crash increases. Up to 59 percent of fatal crashes and 25 percent of nonfatal crashes involve drinking drivers with blood alcohol concentrations (BAC) of 0.10 percent or higher.

- The probability of crash involvement increases dramatically as a driver's BAC increases. The relative risk factor of being involved in or causing a crash at a BAC of 0.05 percent is one and a half times that at 0.02 percent. At a BAC of 0.10 percent, compared to 0.02, the relative risk doubles for being involved in a crash and quadruples for causing a crash.

- At all BAC levels, male drivers aged 18 to 24 years or 65 years and older are the most likely to be involved in a crash.

- In studies in which multiple criteria are used, up to 37 percent of DWI (driving while intoxicated) arrestees are identified as alcoholics, and a total of 48 percent are identified as persons with serious drinking problems.

- A significant number of industrial and aviation accidents, drownings, burns, and falls have been attributed to drinking. Studies have found that up to 40 percent of fatal industrial accidents, 69 percent of drownings, 83 percent of fire fatalities, and 70 percent of fatal falls were alcohol related.

- While information on the role of alcohol in crime is limited, studies show relatively high involvement of alcohol in robbery, rape, assault, and homicide. Alcohol-involved crime often includes both a drinking offender and a drinking victim.

- More than one-third of suicides involve alcohol, and disproportionately high numbers of people with drinking problems commit suicide. In 1975, as many as 10,000 suicides were related to alcohol use, and up to 8,400 alcoholics committed suicide.

- Alcohol and family abuse is a neglected area of research. Excessive drinking has been implicated in child abuse, child molesting, and marital violence. A large number of child abusing parents have histories of drinking problems.

- There is a great need for improved (definitive) epidemiologic data on alcohol-related deaths, injuries, and acts of violence, including the

proportion that is directly attributed to the alcoholic population.

Chapter IX. Treatment of Alcoholism and Problem Drinking

- A major ideological issue within the field involves abstinence versus controlled drinking. Efforts are being made to gather valid data for differentiating those clients for whom the one goal is more appropriate, feasible, or desirable than the other. NIAAA, however, continues to endorse abstinence as the most appropriate treatment goal for alcoholism. While change in drinking behavior remains the primary goal of most treatment programs, increasing attention is directed toward psychological, social, and vocational criteria.

- Changes in treatment have occurred more as shifts in emphasis than as new discoveries. Pharmacological agents are advocated and used during various stages of treatment including detoxification, sensitization against alcohol, and postdetoxification long-term treatment. However, there has been a shortage of research and evaluation oriented toward these agents resulting in a lack of conclusive evidence regarding their efficacy. The trend in behavioral approaches is away from development of theory in favor of comprehensive, eclectic treatment plans based on observation of specific drinking behavior. Variations of the general approach now include aversion, assertiveness, relaxation-meditation, and biofeedback training.

- The historical concern for the most desirable mixture of client populations now centers on the pros and cons of treating alcoholics and drug addicts together or separately. Although evidence to date is meager, the combined treatment of these groups appears feasible. Its general effectiveness is yet undetermined.

- Systematic, well-designed studies of treatment effects are rare, particularly those that have used random assignment of subjects to control and experimental conditions. Few differences in effectiveness among treatment settings, types, and duration have been identified. The patients' characteristics and motivation may be the essential factors in the recovery process.

- Although many treatment resources exist, most people with alcohol- related problems do not receive treatment for them. Practitioners in the field of alcoholism and alcohol abuse have become increasingly aware of overt and covert barriers to treatment. While social stigma continues as a major deterrent to treatment, clients resist treatment for many reasons. Further problems arise from inadequacies of the treatment delivery system. Underlying attitudes of blame, pessimism, racism, and sexism among traditional treatment personnel help perpetuate the numbers of alcoholics treated ineffectively.

Chapter X. Occupational Alcoholism Programing

- Occupational alcoholism programs as a mechanism for early identification and intervention of alcoholic employees are receiving ever- increasing acceptance. Program concepts have expanded and the role of the alcoholism specialist known as the Occupational Program Consultant is shifting from that of a promoter or seller to one more similar to consultant in the business world.

- Between 1950 and 1973, the number of occupational alcoholism programs expanded from around 50 to an estimated 500. By mid-1977, however, the number of organizations with some type of program had increased to nearly 2,400, with approximately 2,000 in the private sector, and 400 in public sector agencies and organizations.

- Earlier occupational programs were placed primarily in medical departments, whereas the present trend is toward placement in personnel/ industrial relations/employee benefits divisions.

- Increased emphasis is being placed by programing specialists and organized labor on the role of the union in the development and implementation of company programs.

- There is also increased emphasis on the role of the supervisor in noting and confronting employees with impaired performance, although diagnosis of alcoholism is made by a qualified professional.

- A substantial majority—72 percent—of executives among "Fortune 500" companies with occupational programs believe that their organizations have saved money as a result of their companies' programs. A positive assessment of program effectiveness in overcoming job impairment due to alcohol use was almost universal among this group.

- A variety of studies indicates that occupational programing has the potential of even greater effectiveness, while evaluation of present efforts reveals areas of activity in which program outcomes may be enhanced even further.

- A number of groups and organizations have not been involved in occupational programs. These include small businesses, executives and similar upper echelon personnel, most professionals, and persons working in isolated occupational settings.

Chapter XI. Financing Alcoholism Treatment Services

- Federal, State, and local government funds constitute a significant proportion of the resources for alcoholism treatment. If adequate treatment coverage is to be provided to alcoholics, a major increase in the share of this support must be provided by health insurance.

- Lack of third-party reimbursement has limited the number of service providers. Until recently, insurance carriers were reluctant to cover treatment of alcoholism, but the trend is changing. For example, in 1972 approximately 25 percent of all Blue Cross plans specifically excluded alcoholism. By 1976, only 4 of 60 plans responding to a survey excluded alcoholism treatment.

- Although some private insurance carriers still exclude or limit alcoholism treatment, increasing numbers are providing coverage.

- Increasingly, comprehensive alcoholism benefits are being offered by individual Blue Cross plans. Some offer alcoholism treatment in special inpatient centers and others provide innovative outpatient care. The United Auto Workers union Blue Cross coverage includes both residential and outpatient treatment.

- Many employee health insurance plans specifically include inpatient alcoholism treatment; far fewer cover outpatient treatment.

- State legislatures are concerned about the availability of insurance for alcoholism treatment. Twenty States have enacted legislation either mandating that alcoholism coverage be provided or requiring that it be available as an option.

- Preliminary findings from a California experimental project indicate that the average monthly nonalcoholism health care costs for both the alcoholic and the immediate family were reduced by 25 percent after the individual began treatment for alcoholism.

- Various benefits are offered in the public sector. Current medicare provisions for alcoholism treatment to the aged and disabled are restrictive compared to benefits available for physical disease. Medicaid programs often ignore treatment for alcoholism. The Supplemental Security Income Program (title XVI of the Social Security Act) employs sanctions against the alcoholic who fails to stay in treatment. Alcoholism treatment is specifically provided for under the Social Services for Individuals and Families Program (title XX of the Social Security Act) in 10 States, and specific alcoholism services are reimbursed by 11 States.

Chapter XII. The Prevention of Alcohol Problems

- With the exception of programs directed toward teenage drinkers and drunken drivers, prevention traditionally has been seen as an effort to identify alcoholics early and urge them to enter treatment.

- Many prevention programs have no clear definition of what they are trying to prevent. The five general areas in which most alcohol problems fall should provide some guidance: chronic illness or disability and early mortality; acute health problems related to a specific drinking incident; injuries, homicides, suicides, and property loss during and after drinking; nonfulfillment of major social roles, notably those affecting family and jobs; and mental problems related to drinking.

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- According to the public health model, problems are seen as stemming from an interaction among three factors—the host, the agent, and the environment. In dealing with the prevention of alcohol problems, the public health model becomes as follows: host (the individual and his or her knowledge, attitudes, and drinking behavior); agent (alcohol, its content, distribution, and availability); and environment (the setting or context in which drinking occurs).

- To date, much of the work in prevention has focused upon the host or individual. Primary aims have included increasing knowledge about alcohol and its effects, modifying attitudes to support moderate drinking or abstention, increasing the individual's decisionmaking ability and interpersonal skills, building self-concept, and modifying drinking behaviors.

- The belief in education as a solution to social problems is longstanding in the United States. Although the evaluative literature has not demonstrated its effectiveness in changing behavior, alcohol education nevertheless is generally considered an important tool in preventing alcohol abuse.

- Alcohol issues have received considerable attention on television, radio, and in the press. Although the 30- or 60-second public service spot on television has not been a major influence on drinking behavior, counteradvertising in combination with followups such as discussion groups or interpersonal relations might be an effective way to modify attitudes and behavior. While directing these campaigns is more arduous and less immediate than developing media spot announcements, the potential long-range benefits cannot be ignored.

- Research is needed to test the effects on drinking behavior of modifying the content, distribution, and availability of alcohol. Some of the aspects that might be involved in this testing could include adjusting pricing policies, taxes, and zoning regulations, as well as reducing the alcohol content in beverages and raising the minimum drinking age.

- Research on preventive measures involving the drinker's environment has not been so extensive as attempts to change the individual's drinking knowledge and attitudes. Further experimentation is needed to test the impact of such strategies as modifying drinking settings, insulating the individual from the actual or potential effects of his or her own drinking behavior, changing reactions to drinking, modifying the consequences of drinking, influencing cultural mores, and applying criminal law and police powers.

Recommendations

The Department is actively involved in the development of goals and initiatives for national action related to alcohol consumption and health. The information in this report will be used extensively in the formulation of Department policy. The Secretary will make recommendations to Congress for legislative action concerning the problem of alcohol use and abuse at appropriate times during the coming year.

Introduction

Beyond the obvious role of the Federal Government in translating public moral judgments about alcohol and alcoholism into law during the past 200 years, the history of active Federal involvement in the alcoholism field has been a short one indeed. As late as 1965, there was but one identifiable alcoholism specialist among the entire staff of the National Institute of Mental Health. In 1967, a small National Center for the Prevention and Control of Alcoholism was established within the National Institute of Mental Health, but its budget of less than $3 million was a very small sum to combat an illness that afflicted millions of Americans. It remained for landmark legislation at the end of 1970 to initiate a new era of significant Federal leadership and commitment to the problem of alcohol abuse and alcoholism.

When the National Institute on Alcohol Abuse and Alcoholism was established 7 years ago, the field of alcoholism was fragmented, and many aspects of the subject were virtually unexplored. It was essential to develop a substantial body of research and information on which to base program and policy development. In 1971, the First Special Report to the Congress on Alcohol and Health represented the first effort in the history of the Federal Government to collect and transmit to the American people a substantial portion of the current knowledge about alcohol and its effect on health. The Second Special Report, published 2½ years later, covered the new knowledge gained in the field since the initial report was issued. As the Institute has matured, along with the alcoholism field, our knowledge base has grown tremendously, as reflected in this Third Special Report to the Congress on Alcohol and Health.

This Third Special Report stands as important testimony to the continuing progress we have made in the alcoholism field. But its negative aspects cannot be ignored. We now know that the problems are far more extensive than we realized at the time of the First Special Report. We currently estimate that there are 10 million problem drinkers (including alcoholic people) in the United States, and each of them directly affects the lives of many others—family members, coworkers, employers, friends, innocent bystanders—so that literally tens of millions of Americans face some form of negative consequences due to alcohol misuse. In purely economic terms, the alcohol-related cost to our society in 1975 is estimated at nearly $43 billion in lost production, medical expenses, motor vehicle accidents, violent crime, fire losses, and the maintenance of social mechanisms to deal with the problems—and that figure covers only the losses we can measure. Alcoholism shortens life expectancy by an estimated 10 to 15 years. It also contributes significantly to such serious conditions as heart disease, cancer, and diseases of the liver. Patients with alcohol-related problems occupy an unwarranted proportion of the Nation's hospital beds. Alcohol may be involved in as many as one-third of all suicides, half of all homicides, half of all traffic fatalities, and one-quarter of all nontraffic accidental deaths. Furthermore, alcohol is now suspected to be a major factor in child abuse and marital violence. In total, more than 200,000 premature deaths each year may be associated with alcohol misuse and hundreds of thousands more people suffer alcohol-related illnesses or injuries.

In the past, our society's alcohol-related problems have been either ignored altogether by the general population, or tolerated as an inevitable consequence of widespread alcohol consumption. But this legacy of society's neglect is not immutable, and the prognosis for change is better today than it has ever been in our history. This report to Congress and the American people comes at a time of rapidly shifting social concerns in this country, and the trend is promising. We are in the midst of a revolution in human values that started with the civil rights movement of the 1950's. As individuals and as a society, we are moving away from a primary focus on materialistic values, status goals, and unqualified growth for growth's sake in favor of a

growing concern with the physical and human environments in which we live. This expanding focus has taken expression in the phrase "quality of life," and its implications for the alcoholism movement are important. For as our society moves toward more humanistic values, spiritual concerns and community goals, new and humane possibilities for change are opening up.

The price we pay for alcohol problems must be counted in terms of the impact of such problems on the quality of our lives, and not just in the diminished health prospects for those Americans directly affected. Without question, rampant alcoholism seriously and significantly diminishes the quality of life in this country—whether it is the wasted resources, the anguish of a family when a spouse with a drinking problem loses his or her job, the misery of the alcoholic, or the pain and torment of a battered wife or abused child. Statistics alone cannot measure the cost in human misery endured by millions of Americans, every day and every year.

A Nation increasingly concerned with improving the quality of life cannot tolerate a health and social problem of this magnitude—one that, with increased understanding and commitment, could be controlled. Polio has succumbed to control; heart disease and certain cancers are yielding to concerted efforts. Alcohol abuse and alcoholism—our largest untreated, treatable disease—can be controlled, too, if we can generate the necessary national will.

The magnitude of the destruction and the treatability of the disease demand that a major, expanded national effort be undertaken to reduce the adverse consequences of alcohol use in our country. Our goal must be to reduce the incidence of alcohol-related casualties while assuring that all who need help can get it. To achieve this, the Congress, Federal agencies, State and local governments, private industry, labor unions, volunteer organizations, and the general public must cooperate to spotlight the various kinds of problems associated with alcohol and work to end society's complacency. This is essential, for despite the gravity of alcohol-related problems, they are consistently unrecognized or ignored. Treatment for alcoholism, even though it is considered a disease, is all too often considered peripheral to the health care system. It is still not covered adequately in most health insurance plans; many hospitals still shun the alcoholic person; social stigma or the fear of it deters many alcoholics from treatment, and those who seek treatment are often discouraged or rejected in their attempts to obtain it; and too many health professionals have no interest in research or treatment.

As the focal point for Federal activities in the alcoholism field, NIAAA is working with the field to develop a national plan designed to end alcoholism's outcast status and incorporate the illness into the mainstream of the social and health care delivery system. During the next 5 years, years, NIAAA will

- Work to make treatment resources more available, accessible, and effective;
- Work to obtain the same level of health coverage for alcoholism that other diseases now have;
- Emphasize and promote prevention as a major strategy for reducing the incidence of alcohol abuse and alcoholism; and
- Seek a major increase in the Nation's investment in research on alcohol-related problems.

In pursuing these goals, we must keep in mind that, just as the pervasiveness of this Nation's alcoholism problem is a justifiable source of continuing concern, so the treatability of the illness is just as surely a source of continuing hope.

The National Institute on Alcohol Abuse and Alcoholism was established to address the problem on many fronts, but the primary focus of its past efforts and the object of most of its resources to date have been in the area of treatment. For decades, the volunteer movement was left to shoulder the burden of treatment alone, even after it proved to an uncaring society that alcoholic people could be helped. Those pioneering efforts have been a continuing source of inspiration to an entire field that has grown up in recent years. The decade of the seventies has seen the development of a nationwide alcoholism service-delivery system. And as our knowledge of the illness has expanded and our experience with various treatment approaches has grown, the quality of services provided has been continually improved.

Most notably, the field has enhanced its ability to tailor various treatment programs to the needs of individuals, and, in the process, the treatability of the illness and the demonstrated

cost-effectiveness of providing people with proper care have reaffirmed and reinforced our initial hopes.

The Federal Government needs to continue its commitment to treatment. For as far and as quickly as the field has progressed, the fact remains that we are presently treating only 10 percent of the 10 million Americans who are in need of help.

Obviously, we cannot be content simply to maintain the status quo. In contemplating a continuing, significant Federal role, it will be our aim not only to expand the availability of treatment services, but also to refine treatment approaches in the light of our growing experience. There exists today a tremendous variety in the philosophies, techniques, and settings used for treating alcoholism. However, the concepts of treatment assessment and clinical trials are not yet well established within the field. NIAAA will be working to correct this and establish treatment standards as part of its continuing effort to improve the quality as well as the quantity of available care.

Along this vein, there has been a significant movement in recent years toward the accreditation of treatment facilities and the credentialing and training of alcoholism counselors. More than 250 alcoholism treatment facilities have met the standards of the Joint Commission on Accreditation of Hospitals and have received accreditation. At least 11 States have established systems for credentialing or licensing alcoholism counselors. Thirty-six States report that counselor training is available, and 18 report that examinations would be a part of evaluation for credentialing and licensing. Thirty-one States have credentialing systems planned or operating. Through its Career Teacher Program, the Federal Government has provided support to one-third of the Nation's medical schools to provide training for physicians working with alcoholic individuals.

Treatment resources are of high value only if they are suited to specific individuals who need help. In this context, we are becoming increasingly aware of the innumerable barriers to treatment that exist. The stigma attributed to alcoholism and the tendency of individuals to deny problems are well recognized. However, many other problems ranging from cultural and language incompatibilities to the need for child care facilities deter people from seeking help. These barriers must be identified and overcome. The categorical research and treatment demonstration programs supported by NIAAA will continue to help explore such problems.

Clearly, however, public funds alone cannot support alcoholism treatment programs at the required level, and limited-scale demonstration programs cannot sweep away barriers so fundamentally entrenched in our society. That obviously will take sustained effort over a long period of time. But if we are ever going to have any chance of reaching and responding to the growing public awareness of alcohol problems and their effect on the quality of life, public and private third-party reimbursement for alcoholism treatment must become an established and widespread practice. Unfortunately, insurance companies and the Federal Government have been slow to develop reimbursement mechanisms, partly due to a traditioinal belief that alcohol problems are self-induced, hard to treat, or simply untreatable. Insurers have also been uncertain about the quality and cost of care available, especially in settings other than hospitals. The relative lack of availability of third-party reimbursement for alcoholism treatment services has served as a powerful disincentive—dissuading alcoholic people from seeking treatment, inhibiting the growth of treatment programs, and reinforcing the stigma the illness bears in the minds of society. The Institute has been working with the medical insurance industry to develop and implement model benefit programs for alcoholism services, and the experience gained will serve as an important incentive for the expansion of such programs in the foreseeable future.

The progress toward accreditation and credentialing has also afforded the insurance industry with increased incentive to provide benefits for alcoholism treatment. Furthermore, several States have mandated insurance benefits for alcoholism treatment in legislation regulating insurance companies. In 1974, only four States required insurance companies to include alcoholism treatment in their benefit packages. Three years later, more than half the States either have passed or are considering legislation to require insurance carriers to cover treatment for alcoholism.

Although an expanded nationwide capability for quality alcoholism treatment properly deserves to be and will remain a high Institute priority, we must keep in mind that treatment alone will never be enough to enable us to come to grips with alcohol abuse and alcoholism in this

country. If we are serious about developing mechanisms which will permit us to confront alcohol-related problems on a scale commensurate with their enormous magnitude, then we are going to have to place much more emphasis on prevention than we have ever done before.

Our efforts at prevention in the past have most often been more rhetoric than substance. The approaches we have tried have concentrated primarily on the individual, and they have met with very limited success. The Institute is presently formulating a new approach to alcoholism prevention, building along the lines of the three-pronged, host/agent/environment public health model, rather than continuing to rely on a single-focus involving only the individual, or host.

A national prevention plan must include objectives aimed at

- The reduction of specific alcohol-related casualties, disabilities, and death;
- A reduction in the number of light and moderate drinkers who progress into heavy drinking; and
- The identification of special risk populations and the development of specific strategies to reduce the likelihood of alcohol problems within those groups.

The overriding purpose of a national prevention effort is to provide the information necessary to allow people to make informed choices about alcohol use. It is wrong and socially destructive not to warn social drinkers of the potential risks in the misuse of alcohol. And it is also wrong, indeed cruel, to wait until someone becomes hopelessly ill before offering assistance. The progressive drift from social drinking to the misuse of alcohol and alcoholism often occurs because people are uninformed about alcohol and its potential consequences for their personal well-being.

We need considerably broader knowledge about the perceived place of alcohol in American life, and we must relate that knowledge to the diversity of populations and cultures that make up our society. We need to address the norms governing alcohol use and drinking behavior to the degree that consequences destructive to the quality of life of Americans are no longer condoned. We also need to address the more formalized controls of law, taxation, and pricing and the ways they can be used to influence individual drinking behavior so that alcohol problems are reduced.

People who choose to drink alcoholic beverages must be made aware of the consequences to the extent that we know them. The countless ways we integrate alcohol into our lives—from the college beer bust to the cocktail party to the drinks before, during, and after dinner—must be examined critically by millions of people. Every American should be encouraged to analyze personal and societal practices and attitudes toward alcohol. People must become conscious of when, where, why, how much, and how often they drink—and the corresponding degree of risk they are assuming.

It has been assumed in the past that the alcohol beverage industry is not obligated to inform consumers about the risk side of the drinking equation. That circumstance is changing. The consumer movement has propelled us into an era of fair labeling practices and truth in advertising.

The time has come for a national code of alcohol advertising standards to be developed in cooperation with the alcohol beverage industry. Advertising that may exert an undue influence on young people needs to be reexamined. The special risks that people take when they drink alcohol in conjunction with other drugs and medications need to be clearly identified to consumers. Those who are incurring risks when they drink at all need to be so informed. The safe use of its product is an industry responsibility.

Beyond transmitting the information necessary to permit people to make informed choices about alcohol, a basic component of any prevention program must be the early identification of those who exhibit early signs of a disease process so that they can be treated immediately. Early intervention can prevent the most costly and destructive aspects of alcoholism from occurring. Alcoholism is like other diseases in that respect. And, as with other diseases, the earlier the diagnosis, the better the prognosis. Until this decade, however, early intervention has been almost nonexistent in the field of alcoholism. But this, too, is changing.

Since impaired on-the-job performance is one of the first signs of trouble with alcohol use, the Institute has capitalized on this by promoting the establishment of occupational alcoholism programs at worksites throughout industry and

government. Over the past several years, occupational programs have spread rapidly and now total more than 2,000. This growth has been fostered through the combined efforts of the Institute, State alcoholism authorities, voluntary organizations, management, and organized labor.

What has emerged from these programs is a clear record of substantial benefits to employers and employees alike. Employees with drinking problems are receiving treatment and are thus able to keep their jobs. Early intervention is producing high recovery rates, and thus employers are finding the programs to be cost-effective because they reduce poor job performance and the need to train replacements. The employees' families and communities are being spared the social and financial costs of chronic alcoholism, and, since early treatment is more effective and less expensive, overall costs are minimal.

General Motors of Canada, for example, has come up with some dramatic findings from their occupational program. Among a group of their employees who accepted treatment for a drinking problem, sickness and accident benefit costs dropped 48 percent, workmen's compensation costs dropped 64 percent, and disciplinary grievance procedures went down 58 percent. Among another group of employees who declined such treatment, sickness and accident benefit costs climbed 128 percent, workmen's compensation costs went up 77 percent, and disciplinary grievance procedures increased 33 percent.

Today, half of the "Fortune 500" companies now have occupational alcoholism programs. Encouraging as this progress is, however, we still have a long way to go before occupational programs become the rule rather than the exception in the Nation.

Workplace, home, or school—wherever prevention initiatives are directed—what we are really seeking, in the broadest sense, is to raise the misuse of alcohol and alcoholism to the level of a caring issue. When relatives, friends, and coworkers begin to integrate an awareness of alcohol problems into their increased concern for the quality of life, when they begin to understand that alcohol problems occur far beyond the boundaries of skid row, and when they are able to recognize the problem developing and care enough to intervene, then we will have the kind of prevention dynamics taking place that can bring about a significant reduction in the Nation's alcohol problem.

New directions in prevention and treatment in an increasingly favorable social environment point to an encouraging future for the alcoholism movement. But underlying these initiatives there must be commensurate growth in our base of knowledge. If we are going to fulfill our Federal responsibility to provide people with the information they need to make informed decisions about alcohol, we must continue to ask the hard questions. As fast as our knowledge has grown in recent years, we still have many more questions than answers, and much ignorance persists. Our ability to weep questions than answers, and much ignorance persists. Our ability to sweep away entrenched social barriers to future progress is going to depend in a fundamental way on our ability to substantiate hypotheses with facts.

As a vital component of our future activities, the Institute is planning a significantly increased commitment and expanded focus in the research area. We will be working to increase basic knowledge in the field, and we will be making strong efforts to translate our research findings into effective treatment and prevention initiatives.

As one aspect of our research commitment, we intend to be aggressive in seeking out and studying all aspects of life that may be adversely affected by alcohol. The fetal alcohol syndrome (FAS) typifies this concern, and exemplifies our commitment to translating research into prevention on the basis of facts rather than prejudice. It has been assumed since ancient times that excessive alcohol use during pregnancy could damage an unborn baby, but no scientific proof existed. In recent years, scientists began to investigate and found that women who drink heavily during pregnancy significantly increase the risks of bearing deformed and mentally retarded babies. At a national conference of scientists in February 1977, the evidence was reviewed and affirmed. The public was alerted by NIAAA to the danger. Subsequently, the Food and Drug Administration recommended that labels be placed on alcoholic beverage containers warning the public of these risks. Our research will continue in this area, and we will also continue to investigate other ways in which alcohol can be harmful.

The Institute is also developing a major program to gather more accurate and complete epidemiological data on alcohol-related problems. We must be able to relate the incidence of problem drinking and alcoholism to such factors

as age and sex, personality, family structure, ethnicity, and work habits and conditions. Then, prevention strategies appropriate to specific high-risk populations could be devised. Current evidence suggests that youth, the aged, women, men, and minorities all may require different approaches.

The unanswered questions involving the precise causes of alcoholism and the consequences of alcohol use are discussed at length in this report. We need to know if tolerance and dependence are separate processes, or if tolerance is an early phase of a process leading to dependence. We must determine the role of alcohol in certain forms of brain damage. We need to understand more fully how alcohol interacts with the endocrine system. We must find medications to counteract the effects of alcoholism on the brain and body.

There is also an urgent need for biological, psychological, and social markers to identify problem use of alcohol at the earliest stages—when it is most treatable. Methods that would detect a genetic predisposition to alcoholism through measurement of biochemical differences in people would be a breakthrough for prevention. Susceptible individuals then could be identified during medical examinations and be counseled.

To emphasize the continuing need for increased understanding through research and development, the Institute has established nine alcohol research centers throughout the country to study alcoholism and all aspects of alcohol problems, including causation, behavioral effects, biomedical effects, treatment, and prevention.

Taken together, all of our research, prevention, and treatment initiatives constitute an ambitious agenda for a Federal program with limited resources arrayed against the continuing tremendous needs of the alcoholism field. The reality is that we will achieve our aims only by acting as a catalyst to unlock the greater mechanisms for change that exist within the larger society. And fortunately, the burden of this effort is not being carried by NIAAA alone. One of the great growth stories of this decade has been the emergence of a committed, caring, diverse alcoholism constituency.

At certain times in the past, diversity has meant fragmentation within the ranks of the alcoholism field. We have all experienced the growing pains of a movement growing to maturity. But now we are seeing a convergence of interests as we have increasingly worked together reviewing programs to better define and plan common goals. We are developing the kind of strengthened partnerships that will make us more effective in tackling the monumental task that lies before us. And we must continue this trend. For if we all work together, our common commitment will grow into a common force, and soon we will be seeing a more effective and vigorous attack on our Nation's alcohol problem.

If 1977 can be considered as the beginning of a new era of concern for human rights abroad, then it is cruelly ironic that here in our own country millions of alcoholic people are being denied basic human rights—the right to treatment, informed choice, dignity, understanding, and care. As the alcoholism movement points more and more toward a set of common goals, we can expect a coalescing of the kind of enthusiasm and energy that can insure real progress for people who desperately need our help.

The Third Special Report to the Congress on Alcohol and Health marks another significant step in the deepening search to get at the roots of the alcohol problem. This search will continue, and our original priorities will not be neglected, even as new priorities emerge. With our growing base of knowledge, we are now confident that the prevention of alcohol problems is our most urgent challenge. And, while we realize that it will not be easy to change the drinking attitudes and behavior of a Nation, we also recognize that the need is clear, the benefits are immeasurable, and the goal deserves the commitment of every American.

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Chapter I.

Alcohol Use and Alcohol-Related Problems—Prevalence and Patterns

Approximately one-third of adult Americans drink alcoholic beverages at least once a week and another third drink primarily on special occasions Of the remaining third, half always have abstained and the other half currently do. One of 10 adults who drink currently experiences problems with alcohol and more than 25 percent have potential problems. Alcohol-related problems cost the U.S. economy almost $43 billion in 1975.

This chapter analyzes some of the major contributing factors that influence the patterns, prevalence, and trends of alcohol use and abuse; changing attitudes toward drinking and alcohol-related problems; and the economic costs associated with alcohol-related problems.

Patterns of Alcohol Use

Drinking practices are influenced by population characteristics, availability of alcoholic beverages, drinking contexts, geographical location, and historical trends.

Population Characteristics

It has been well documented that population characteristics influence, but do not solely determine, the quantity and frequency of alcohol use. However, since populations are constantly changing, relationships between drinking practices and population characteristics must be interpreted over time with caution. Characteristics known to influence alcohol consumption and discussed in greater detail throughout this report include sex, age, education socioeconomic status, occupation, residence, ethnicity, and religious affiliation.

Alcohol Availability

Although availability of alcoholic beverages is a function of supply and demand, both private enterprise and government affect the marketplace. Aggressive advertising and marketing may even increase demand and, therefore, the supply of alcoholic beverages. Government regulates the price to the consumer by taxation and, in some States, by direct controls. Furthermore, government controls distribution through age requirements, number and location of sales outlets, and hours and days of sale.

Increased availability has occurred as a result of the lowering of the drinking age in several States, a trend to longer hours of sale, and an increase in the number of retail outlets.

Drinking Contexts

Americans generally drink in their own and their friends' homes. An analysis of survey data showed that slightly more than 40 percent of all drinkers usually drank at home; slightly less than 40 percent drank most frequently at parties; and approximately 10 percent drank most often in restaurants, bars, or taverns. Among all respondents, drinkers and nondrinkers, the percentages of people who "sometimes" attend parties where liquor is served decreased from 31 percent in 1973 to 26 percent in 1974, and a corresponding increase in those "seldom" attending such parties was found. This decrease was limited to females, although for female drinkers, parties continued to be where most of their drinking occurred.

The drinking context can influence the choice of beverage and vice versa, and both affect the amount consumed. For example, distilled spirits are thought of as a party drink and are

consumed more often with friends than with family.

Geographic Variation in Alcohol Consumption

Since population characteristics and alcohol availability vary considerably among the States, the apparent consumption and types of beverages sold also vary (table 1). Nevada, the District of Columbia, and New Hampshire have the highest apparent per capita consumption; West Virginia, Utah, and Arkansas have the lowest.

Analyzing these variations is a complicated matter. In places such as Nevada and the District of Columbia, high apparent consumption rates are explained at least partly by tourism. Residents of nearby States often purchase their alcoholic beverages in New Hampshire and Vermont because prices generally are lower. In "vacation States," consumption will be relatively high because people on vacation are likely to drink more. Finally, high wine consumption in California may be a reflection of the wine industry's importance to that State.

International comparisons show that among 26 countries the United States ranks 15th in terms of total per capita consumption but ranks 3rd in the consumption of distilled spirits (table 2). A similar pattern is observed for both the Soviet Union and Poland. The highest levels of consumption occur in Portugal, France, and Italy, where most of the consumption is accounted for by wine. Australia and New Zealand lead the world in beer consumption, but rank 9th and 11th respectively in total consumption of absolute alcohol.

U.S. Trends in Alcohol Use Among Adults

Alcohol use is not a static phenomenon. Many economic, legal, and social factors affect drinking patterns and drinking-related problems. The combined results of several data resources make possible preliminary assessment of both long- and short-term trends in U.S. drinking behavior.

Measuring Consumption Trends

There are two principal methods for measuring alcohol consumption: beverage sales and survey methods based on self-reporting.

Beverage Sales. Tabulations of U.S. beverage sales from 1850 to 1976 for beer, wine, and distilled spirits are shown in table 3. Consumption apparently increased sharply just after the turn of the century and remained high until shortly before Prohibition. By the beginning of World War II, total per capita sales returned to their pre-1900 levels, where they remained for nearly 20 years. About 1960, total per capita sales began to rise significantly, registering a 30-percent gain between 1961 and 1971. The upward trend stopped rather abruptly in 1971, and since then there has been virtually no change in per capita sales in terms of absolute ethanol. However, this apparent stability masks a significant decrease in per capita sales of distilled spirits and a corresponding increase in per capita beer sales (table 3, figure 1).

Population Surveys. Detailed analysis of recent trends in American drinking practices, as determined by seven national surveys conducted between 1971 and 1976, makes a comparison with beverage sales data possible. Survey results are consistent with the beverage sales data, since both indicate that during the 1970's there has been no significant change in per capita alcohol consumption (tables 3 and 4).

Consumption Trends

Increased per capita consumption during the 1960's generally is believed to be due partly to liberalization of alcohol control laws combined with increases in the proportion of young people in the total population and in the number of women drinking.

Since 1971, per capita alcohol consumption (as measured by sales data) has been the highest recorded since 1850, ranging from 2.63 to 2.69 gallons of absolute ethanol per person 14 years old and older (table 3).

Survey data have been used to examine trends within particular population groups between 1971 and 1976. Respondents were classified as abstainers and as moderate, lighter, and heavier drinkers. Abstainers account for little more than one-third of the total population, while heavier drinkers account for about one-tenth. Resultant trends in the drinking pattern are shown in table 4.

Although no significant change in the relative proportion of abstainers and heavier drinkers is observed, analyses of consumption trends by sex and by age groups did reveal some

Table 1. Apparent Consumption,[1] of Alcoholic Beverages in U.S. Gallons per Capita of the Drinking-Age Population,[3] U.S.A. by States, 1976

	Distilled Spirits		Wine		Beer		Total Ethanol Volume	Rank Order
	Beverage Volume	Ethanol Volume	Beverage Volume	Ethanol Volume	Beverage Volume	Ethanol Volume		
Alabama	1.99	0.86	1.04	0.15	19.64	0.88	1.89	48
Alaska	5.08	2.18	3.58	0.52	34.83	1.57	4.27	4
Arizona	2.56	1.10	2.64	0.38	36.60	1.65	3.13	12
Arkansas	1.56	0.67	0.86	0.12	19.26	0.87	1.66	51
California	3.11	1.33	4.84	0.70	29.47	1.33	3.36	7
Colorado	3.20	1.37	3.16	0.46	32.48	1.46	3.29	9
Connecticut	2.93	1.26	2.51	0.36	22.72	1.02	2.64	28
Delaware	3.32	1.43	1.72	0.25	27.69	1.25	2.93	18
Florida	3.37	1.45	2.45	0.36	29.65	1.33	3.14	11
Georgia	2.85	1.22	1.16[2]	0.17[2]	21.89	0.98	2.37	35
Hawaii	3.01	1.29	2.95	0.43	33.16	1.49	3.21	10
Idaho	1.86	0.80	1.87	0.27	33.94	1.53	2.60	30
Illinois	3.01	1.29	2.31	0.33	29.12	1.31	2.93	19
Indiana	1.75	0.75	1.00	0.14	24.21	1.09	1.98	43
Iowa	1.81	0.78	0.72	0.10	28.63	1.29	2.17	40
Kansas	1.60	0.69	0.77	0.11	25.04	1.18	1.98	44
Kentucky	1.84	0.79	0.69	0.10	22.60	1.02	1.91	47
Louisiana	2.47	1.06	1.98	0.29	28.53	1.28	2.63	29
Maine	2.50	1.07	1.76	0.25	31.46	1.42	2.74	24
Maryland	3.37	1.45	2.24	0.32	29.50	1.33	3.10	14
Massachusetts	3.04	1.31	2.62	0.38	29.09	1.31	3.00	16
Michigan	2.47	1.06	2.06	0.30	31.81	1.43	2.79	22
Minnesota	2.79	1.20	1.45	0.21	28.92	1.30	2.71	25
Mississippi	2.02	0.87	0.87	0.13	22.75	1.02	2.02	42
Missouri	1.89	0.81	1.37	0.20	26.65	1.20	2.21	38
Montana	2.62	1.13	1.40	0.20	39.75	1.79	3.12	13
Nebraska	2.26	0.97	1.18	0.17	31.01	1.39	2.53	32
Nevada	9.31	4.00	5.89	0.85	45.54	2.05	6.90	1
New Hampshire	7.04	3.03	3.66	0.53	42.43	1.91	5.47	3
New Jersey	2.77	1.19	2.88	0.42	24.09	1.08	2.69	26
New Mexico	2.28	0.98	2.32	0.34	34.84	1.57	2.89	20
New York	2.89	1.24	3.05	0.44	24.84	1.12	2.80	21
North Carolina	2.02	0.87	1.61[2]	0.23[2]	22.07	0.99	2.09	41
North Dakota	2.80	1.20	1.10	0.16	29.35	1.32	2.68	27
Ohio	1.78	0.76	1.41	0.20	27.55	1.24	2.20	39
Oklahoma	1.81	0.78	0.95	0.14	22.26	1.00	1.92	45
Oregon	2.22	0.95	3.46	0.50	28.84	1.30	2.75	23
Pennsylvania	1.83	0.79	1.54[2]	0.22[2]	29.26	1.32	2.33	36
Rhode Island	2.84	1.22	3.27	0.47	30.83	1.39	3.08	15
South Carolina	2.76	1.19	1.39	0.20	24.80	1.12	2.51	33
South Dakota	2.48	1.07	1.19	0.17	25.16	1.13	2.37	34
Tennessee	1.72	0.74	0.77	0.11	23.77	1.07	1.92	46
Texas	1.90	0.82	1.39	0.20	34.89	1.57	2.59	31
Utah	1.41	0.61	1.04	0.15	20.81	0.94	1.70	50
Vermont	4.11	1.77	3.42	0.50	31.79	1.43	3.70	5
Virginia	2.22	0.95	1.65	0.24	25.13	1.13	2.32	37
Washington	2.59	1.13	3.33	0.48	30.20	1.36	2.97	17
West Virginia	1.91	0.82	0.69	0.10	20.91	0.94	1.86	49
Wisconsin	3.05	1.31	1.87	0.27	40.00	1.80	3.38	6
Wyoming	3.07	1.32	1.45	0.21	40.53	1.82	3.35	8
District of Columbia	8.24	3.54	6.46	0.94	29.61	1.33	5.81	2
Average	2.54	1.09	2.26	0.33	28.09	1.26	2.68	

SOURCE: Data updated from Mark Keller and Carol Gurioli, *Statistics on Consumption of Alcohol and on Alcoholism.* New Brunswick, N.J.: Rutgers Center of Alcohol Studies, 1976.

[1]For comparative purposes only. Amounts calculated according to tax paid withdrawals.

[2]Data are from 1975; 1976 data were not available.

[3]Data are based on a drinking-age population 14 years and over.

Table 2. Apparent per Capita Consumption,[1] in Gallons, of Alcoholic Beverages by Persons 15 Years Old and Older in 26 Countries[2]

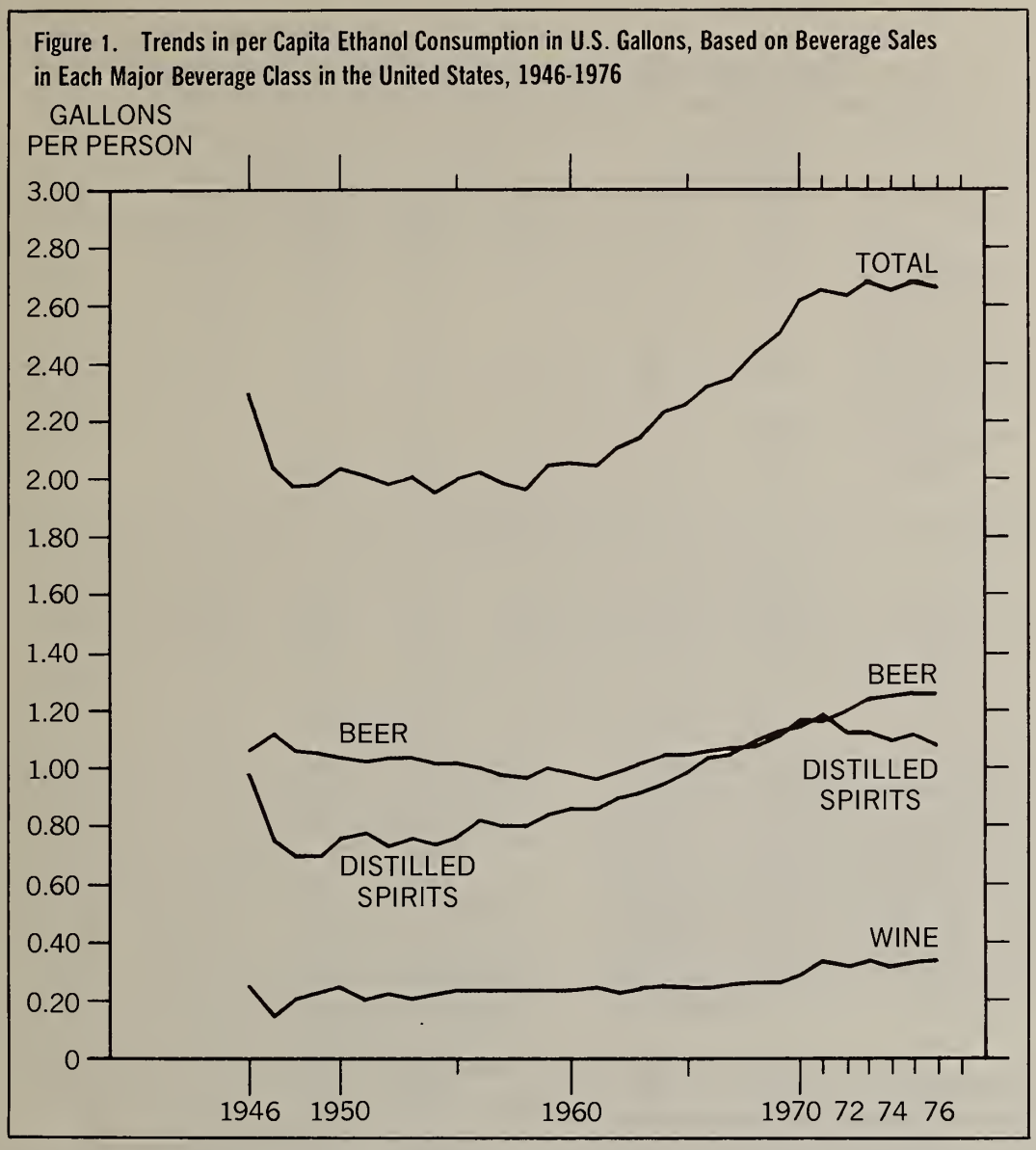
Rank	Country	Year Of Latest Data	Distilled Spirits		Wine		Beer		Total	
			Beverage Volume	Ethanol Volume	Beverage Volume	Ethanol Volume	Beverage Volume	Ethanol Volume	Persons 15 Yrs. and Older	Entire Population
1.	Portugal	1974	1.20[3]	0.46	43.91	5.27	10.87	0.54	6.27	4.60
2.	France	1972	2.34	0.80	37.40	4.07	20.11[6]	0.99	5.87	4.43
3.	Italy	1973	1.32	0.66	37.91	3.79	4.74	0.24	4.69	3.55
4.	Switzerland	1971-73	1.88	0.75	15.41	1.70	28.72[3,6]	1.39	3.85	2.95
5.	Spain	1971	2.67	1.07	19.83	2.18	1.34	0.53	3.78	2.85
6.	W. Germany	1974	2.39[3]	0.91	7.78	0.82	50.50	2.02	3.75	2.88
7.	Austria	1972	2.10	0.84	11.87	1.25	36.30	1.63	3.72	2.79
8.	Belgium	1973	1.21	0.61	5.26	0.63	48.90[6]	2.15	3.39	2.61
9.	Australia	1972-73	0.82[3]	0.47	3.71	0.45	48.08	2.40	3.32	2.36
10.	Hungary	1972	2.00[3]	1.00	13.36	1.54	19.70	0.69	3.23	2.51
11.	New Zealand	1972	0.85[3]	0.49	2.94	0.35	46.85	2.34	3.18	2.17
12.	Czechoslovakia	1973	2.29	0.92	4.66	0.57	49.69	1.49	2.98	2.30
13.	Canada	1974	2.54[3]	1.01	2.00	0.32	30.27	1.51	2.84	2.07
14.	Denmark	1973	1.25	0.53	3.69	0.55	38.85	1.71	2.79	2.14
15.	U.S.A.[2]	1976	2.65	1.14	2.34	0.34	29.03	1.31	2.78	2.08
16.	United Kingdom	1974	0.93[3]	0.53	2.32	0.28	38.92	1.94	2.76	2.11
17.	Netherlands	1974	1.94[3]	0.97	3.66	0.44	26.74	1.34	2.75	2.04
18.	Ireland[2]	1975	1.36[3]	0.78	1.31	0.14	32.43	1.56	2.47	1.70
19.	Soviet Union[7]	1972	3.30[3]	1.22	6.05[3]	0.91	6.93[3]	0.21	2.34[7]	1.69
20.	Poland	1974	2.87	1.43	2.40	0.29	12.94	0.49	2.21	1.63
21.	Finland[2]	1976	2.81	1.07	1.60	0.24	17.58	0.82	2.14	1.61
22.	Sweden	1973	2.23	0.87	2.42	0.30	15.17	0.67	1.84	1.46
23.	Japan[2]	1974	1.33[3,4]	0.44	5.60[3,5]	0.86	11.63	0.46	1.77	1.34
24.	Norway	1974	1.47	0.63	1.11	0.15	15.24	0.69	1.47	1.11
25.	Iceland	1973	2.30	0.94	0.85	0.10	6.01	0.12	1.16	0.76
26.	Israel	1974	0.97	0.48	1.47	0.18	3.96	0.20	0.86	0.58

SOURCE: Data updated from Mark Keller and Carol Gurioli, *Statistics on Consumption of Alcohol and on Alcoholism.* New Brunswick, N.J.: Rutgers Center of Alcohol Studies, 1976.

NOTE: Only per capita consumption by actual drinkers produces a satisfactory comparison among countries. For the same years as shown in the table, consumption of ethanol per drinker has been calculated for the following countries: Canada, 3.56 gallons; U.S., 3.92 gallons; Ireland, 4.35 gallons; Finland, 3.38 gallons.

[1]For comparative purposes only.
[2]A drinking age population other than 15 years and older seems more accurate in at least these countries: U.S., 14 years and older, total consumption in this group—2.69 gallons; Ireland, 18 years and older, total consumption in this group—2.68 gallons; and Japan, 20 years and older, total consumption in this group—1.90 gallons.
[3]Values converted from ethanol.
[4]Includes shochu.
[5]Includes saki.
[6]Includes cider.
[7]Illegally produced samogon is estimated to increase total consumption to about 2.97 gallons per capita.

Figure 1. Trends in per Capita Ethanol Consumption in U.S. Gallons, Based on Beverage Sales in Each Major Beverage Class in the United States, 1946-1976



interesting changes. Heavier drinking increased significantly for males, from 15 to 20 percent between 1971 and 1976. In all surveys, men showed three to six times the amount of heavy drinking and approximately half the abstention rate of women. Women aged 35 to 49 showed a significant trend to increasing moderate drinking. This trend may be related to changing lifestyles, since women in this age group often reenter the labor force and moderate drinking is more likely among employed women than housewives. There are more drinkers and more moderate and heavier drinkers among younger women than older women; the drinking peak occurs in the 21 to 34 age group and declines steadily thereafter. Men display similar age-specific trends in consumption, although not as pronounced. Drinking in any amount peaks in the 21 to 34 age group and declines steadily for each older age group of men. In men, heavier drinking is highest in the 18 to 20 age group. The rate of heavy drinking, and no doubt alcohol-related problems, declines rapidly after 50 years old for both sexes.

Prevalence and Patterns of Alcohol Abuse

Alcohol abuse is a generic term, applied to the misuse of alcohol, which is manifested in one or more alcohol-related problems or alcohol-related disabilities. Alcohol-related problems involve three broad categories: (1) psychologi-

Table 3. Apparent Consumption,[1] of Alcoholic Beverages, in U.S. Gallons per Capita, of the Drinking-age Population,[2] U.S.A., 1850-1976

Year	Distilled Spirits		Wine		Beer		Total
	Beverage Volume	Ethanol Volume	Beverage Volume	Ethanol Volume	Beverage Volume	Ethanol Volume	
1850	4.17	1.88	0.46	0.03	2.70	0.14	2.10
1860	4.79	2.16	0.57	0.10	5.39	0.27	2.53
1870	3.40	1.53	0.53	0.10	8.73	0.44	2.07
1871-80	2.27	1.02	0.77	0.14	11.26	0.56	1.72
1881-90	2.12	0.95	0.76	0.14	17.94	0.90	1.99
1891-95	2.12	0.95	0.60	0.11	23.42	1.17	2.23
1896-1900	1.72	0.77	0.55	0.10	23.72	1.19	2.06
1901-05	2.11	0.95	0.71	0.13	26.20	1.31	2.39
1906-10	2.14	0.96	0.92	0.17	29.27	1.47	2.60
1911-15	2.09	0.94	0.79	0.14	29.53	1.48	2.56
1916-19	1.68	0.76	0.69	0.12	21.63	1.08	1.96
			— PROHIBITION —				
1934	0.64	0.29	0.36	0.07	13.58	0.61	0.97
1935	0.96	0.43	0.50	0.09	15.13	0.68	1.20
1936	1.20	0.59	0.64	0.12	17.53	0.79	1.50
1937	1.43	0.64	0.71	0.13	18.21	0.82	1.59
1938	1.32	0.59	0.70	0.13	16.58	0.75	1.47
1939	1.38	0.62	0.79	0.14	16.77	0.75	1.51
1940	1.43	0.67	0.01	0.16	16.29	0.73	1.56
1941	1.58	0.71	1.02	0.18	17.97	0.81	1.70
1942	1.89	0.85	1.11	0.20	20.00	0.90	1.95
1943	1.46	0.66	0.94	0.17	22.26	1.00	1.83
1944	1.00	0.76	0.02	0.17	25.22	1.13	2.06
1945	1.95	0.88	1.13	0.20	25.97	1.17	2.25
1946	2.20	0.99	1.34	0.24	23.75	1.07	2.30
1947	1.69	0.76	0.90	0.16	24.56	1.11	2.03
1948	1.56	0.70	1.11	0.20	23.77	1.07	1.97
1949	1.55	0.70	1.21	0.22	23.48	1.06	1.98
1950	1.72	0.77	1.27	0.23	23.21	1.04	2.04
1951	1.73	0.78	1.13	0.20	22.92	1.03	2.01
1952	1.63	0.73	1.22	0.21	23.20	1.04	1.98
1953	1.70	0.77	1.19	0.20	23.04	1.04	2.01
1954	1.66	0.74	1.21	0.21	22.41	1.01	1.96
1955	1.71	0.77	1.25	0.22	22.39	1.01	2.00
1956	1.31	0.81	1.27	0.22	22.18	1.00	2.03
1957	1.77	0.80	1.26	0.22	21.44	0.97	1.99
1958	1.77	0.80	1.27	0.22	21.35	0.96	1.98
1959	1.86	0.84	1.28	0.22	22.15	1.00	2.06
1960	1.90	0.86	1.32	0.22	21.95	0.99	2.07
1961	1.91	0.86	1.36	0.23	21.47	0.97	2.06
1962	1.99	0.90	1.32	0.22	21.98	0.99	2.11
1963	2.02	0.91	1.37	0.23	22.51	1.01	2.15
1964	2.01	0.95	1.41	0.24	23.08	1.04	2.23
1965	2.21	0.99	1.42	0.24	23.07	1.04	2.27
1966	2.26	1.02	1.40	0.24	23.52	1.06	2.32
1967	2.34	1.05	1.46	0.25	23.81	1.07	2.37
1968	2.44	1.10	1.51	0.26	24.33	1.09	2.45
1969	2.51	1.13	1.62	0.26	24.90	1.12	2.51
1970	2.56	1.15	1.84	0.29	26.95	1.17	2.61
1971	2.62	1.18	2.08	0.33	25.90	1.17	2.68
1972	2.60	1.12	2.16	0.31	26.62	1.20	2.63
1973	2.61	1.12	2.25	0.33	27.49	1.24	2.69
1974	2.57	1.10	2.13	0.31	27.76	1.25	2.66
1975	2.58	1.11	2.24	0.32	28.08	1.26	2.69
1976	2.54	1.09	2.26	0.33	28.09	1.26	2.68

SOURCE Data updated from Mark Keller and Carol Gurioli, *Statistics on Consumption of Alcohol and on Alcoholism*. New Brunswick, NJ: Rutgers Center of Alcohol Studies, 1976.

[1]For comparative purposes only. Amounts calculated according to tax-paid withdrawals.

[2]Data through 1973 are based on a drinking-age population 15 years and over; data since 1973 are based on a drinking-age population 14 years and over.

Table 4. Trends in Alcohol Consumption, 1971-1976

Type of Drinker	Percentage in Each Drinking Category							6 Yr. Average	Ounces of Ethanol Consumed in 1 Day[1]	Amount Consumed[2]
	1971	1972	1973, Spring	1973, Fall	1974	1975	1976			
Abstainer	36	36	34	37	33	36	33	35	0	Drinks less than once a year or never
Lighter	34	32	29	30	28	31	38	32	0.01-0.21	One drink a year up to 3 drinks/week or 12 drinks/month
Moderate	20	23	23	21	28	21	19	22	0.22-0.99	4 to 13 drinks/week or 13 to 58 drinks/month
Heavier	10	10	14	11	11	12	10	11	1.0 or more	2 or more drinks/day or 14 or more drinks/week
(N)	(2,195)	(1,544)	(1,588)	(1,603)	(1,578)	(1,071)	(2,510)	(12,090)		

SOURCE: Paula Johnson, David Armor, Susan Polich, and Harriet Stambul, U.S. adult drinking practices: Time trends, social correlates, and sex roles. Draft report prepared for National Institute on Alcohol Abuse and Alcoholism under Contract No. ADM 281-76-0020. July, 1977.

[1] The measure is derived from the frequency of drinking each type of beverage (beer, wine, and distilled spirits) expressed in number of occasions per day, multiplied by the amount of ethanol consumed on a typical drinking day (assuming ethanol proportions of 0.04 for beer, 0.15 for wine, and 0.45 for distilled spirits).

[2] A drink is the equivalent of one 12-oz. can of beer, one 4-oz. glass of wine, or one 1-oz. shot of distilled spirits, each of which contains approximately ½ oz. of ethanol.

cal—loss loss of control over drinking, dependence, and depressive and suicidal states of mind; (2) medical—acute and chronic illnesses and injuries; and (3) social—problems of demeanor and default of major social roles.

Researchers agree that it is useful to distinguish between alcoholism and other alcohol-related problems, because many alcohol-related problems in the society involve excessive use that does not involve alcoholism. Although there is considerable disagreement on how to define and classify alcoholism, most experts agree that addiction or dependence must be present as well as impairment of physical health or of social or psychological functioning. The World Health Organization (WHO) has defined the concepts of "alcohol dependence syndrome" and "alcohol-related disabilities." Problem drinking is another concept which, because of its common usage, requires definition.

- **Alcohol-related disability** is a broad term that includes alcoholism but doesn't require that alcoholism be present.

  An alcohol-related disability exists when there is an impairment in the physical, mental, or social functioning of an individual, so that it may be reasonably inferred that alcohol is part of the cause of that disability. Impairment includes actual health problems related to a specific drinking bout; offensive behavior caused by heavy drinking; injuries, death, and property loss caused by accidents related to drinking; failure of the chronic excessive drinker to fulfill his or her roles in the family or on the job; and mental problems, such as depression and anxiety, related to drinking.

  People manifesting alcohol-related disabilities, although not necessarily alcoholics, have an increased risk of becoming alcoholics.

- **Alcoholism** is addiction to alcohol. It is also defined as alcohol dependence syndrome by WHO and in the ninth revision of the International Classification of Diseases. Alcoholism is characterized by a compulsion to take alcohol on a continuous or periodic basis to experience its psychological and physical effects, and sometimes to avoid the discomfort of its absence. Tolerance may or may not be present.

  The fact that a person is addicted to alcohol (an alcoholic) implies a probable impaired behavioral responsiveness to social control.

- **A problem drinker** is a person who drinks alcohol to an extent or in a manner that an alcohol-related disability is manifested. Therefore, the term problem drinker generally is applied to those who demonstrate problems in relation to drinking alcohol.

It is estimated that there are 9.3 to 10 million problem drinkers (including alcoholics) in the adult population, or 7 percent of the Nation's 145 million adults (18 years and older). This estimate includes both those who are alcoholic and those who are otherwise disabled as a result of alcohol. An estimated 10 percent of the adult male population and 3 percent of the adult female population are problem drinkers. Of the total adult problem-drinking population, 24 percent are female. This estimate is probably low because alcohol problems are manifested somewhat differently among women than among men, and prevalence estimation methodology historically has not accounted for this. Furthermore, some studies have suggested one-third of the problem drinking population is female. More detailed information on female drinking and problem drinking is presented in chapter II.

In addition to adult problem drinkers, there are an estimated 3.3 million problem drinkers among youth in the 14 to 17 age range, 19 percent of the 17 million in this age group. Youth are not generally included in the 10 million adult estimate because their alcohol problems tend to become apparent differently from those of adults. Also, the problems of youth are not amenable to the prevalence estimation methodology currently used for adults. Alcohol problems among youth tend to be acute rather than chronic. For example, they usually involve drinking-driving episodes and belligerence, rather than alcohol-related medical illnesses and addiction per se. However, all youths, regardless of their drinking patterns, obviously represent the population of future adult problem drinkers, and, therefore, represent an important target for effective alcohol abuse prevention programs. More detailed information on youthful problem drinking is presented in chapter II, and discussion of the prevention of alcohol-related problems may be found in chapter XII.

Alcohol-Related Mortality

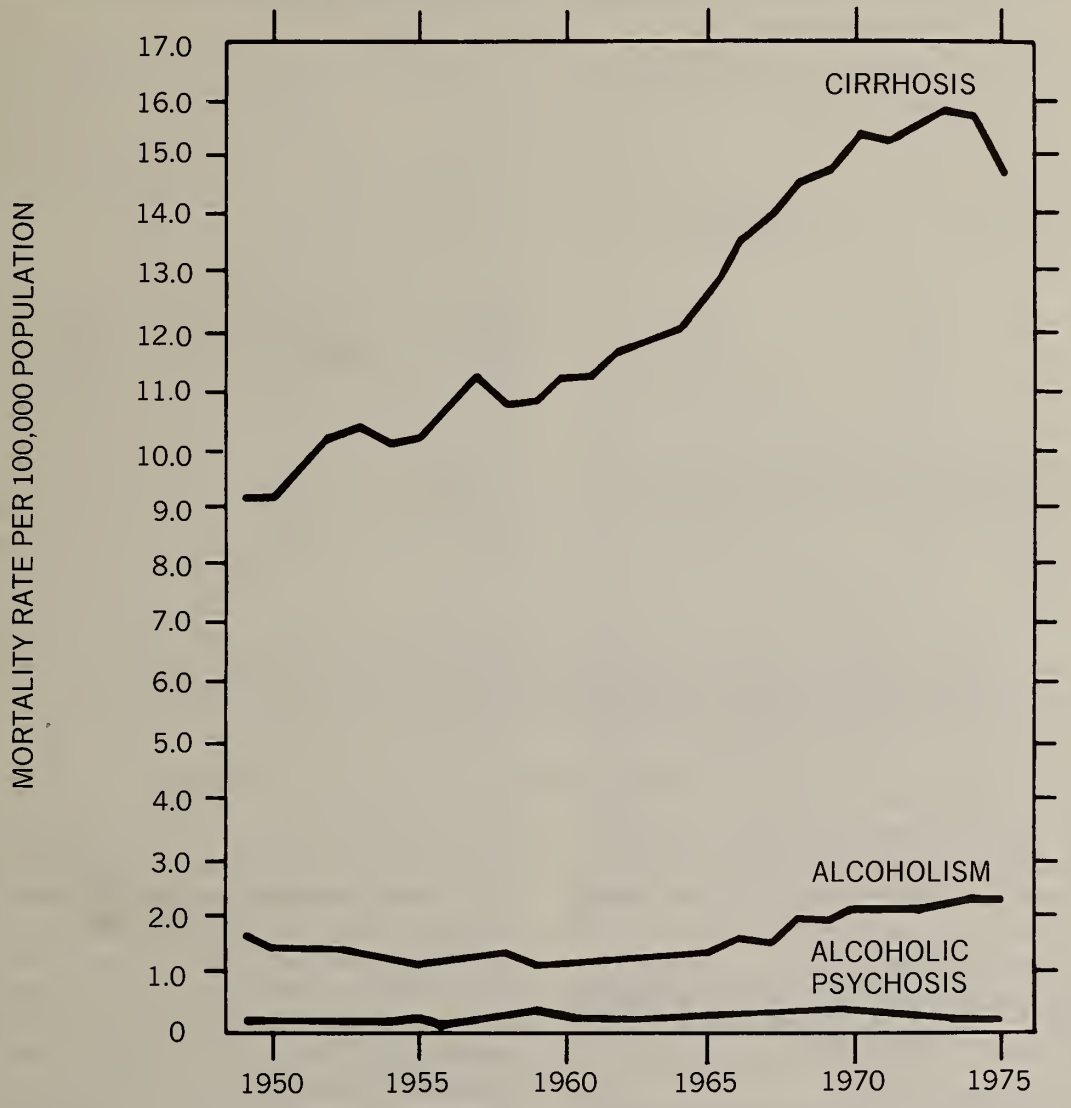
Although epidemiologic data on alcohol use and morbidity are scarce, the relationship between alcohol use and mortality has been demonstrated by several kinds of data. Clinical research shows that alcoholics and those admitted for treatment of alcohol problems have a higher mortality rate than do people in the general population. These studies consistently have demonstrated that alcohol problems in males are associated with a mortality level two to six times higher than expected. Vital statistics also show a substantial number of deaths each year from alcoholism, alcoholic psychosis, and alcohol-related cirrhosis (figure 2). Alcoholism and problem drinking also play a major role in accidents, homicides, suicides, cardiovascular and gastrointestinal diseases, cancer, and other life-threatening illnesses.

The rate of total cirrhosis deaths increased by 36.6 percent from 1960 to 1970, followed by a gradual leveling during the early 1970's and a decrease of 6.3 percent from 1974 to 1975 (figure 2). Preliminary mortality data for 1976 show a continuing downward trend, although a much smaller decrease is evident from 1975 to 1976 than from 1974 to 1975. Despite these encouraging decreases, liver cirrhosis still ranked as the sixth most common cause of death in the United States in 1975, and up to 95 percent of cirrhosis is estimated to be alcohol related.

In general, excessive alcohol use results in an increased risk of dying from alcohol-specific causes, from drinking-related accidents and violence, and from a variety of interrelated illnesses (see chapters III, IV, and VIII, on biomedical consequences, the fetal alcohol syndrome, and alcohol-related accidents, crime, and violence, respectively).

One examination of the alcohol-related mortality literature revealed that alcohol was a direct cause of up to 35,295 deaths in 1975, and an indirect cause of up to 59,708 deaths (29 to 40 percent of all deaths from accidents, homicides, and suicides). Therefore, alcohol was either a direct or an indirect cause of a total of 95,000 deaths in 1975 (table 5). The study was unable to take into account mortality from the wider spectrum of illnesses in which alcohol was a factor because these epidemiological data are sparse. Although research has shown that there is a strong relationship of excessive alcohol use to certain cancers, heart disease, pancreatitis, stillbirths, the fetal alcohol syndrome, and other problems, sound morbidity and mortality statistics are severely limited. Another study that examined mortality in the alcoholic population

Figure 2. Trends in Selected Mortality Rates in the U.S., 1949-1975



SOURCE: Data from National Center for Health Statistics, *Vital Statistics of the United States, 1949-75.* Washington, D.C.: U.S. Government Printing Office, 1975.

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Table 5. Estimated Deaths Related to Alcohol in the United States, 1975

Cause of Death	Number of Deaths, 1975	Percent Related to Alcohol	Estimated Number Related to Alcohol
Alcohol as a direct cause			
Alcoholism	4,897	100	4,897
Alcoholic psychosis	356	100	356
Cirrhosis	31,623	41-95	12,965-30,042
Total	36,876		18,218-35,295
Alcohol as an indirect cause			
Accidents			
Motor vehicle	45,853	30-50	13,756-22,926
Falls	14,896	44.4	6,614
Fires	6,071	25.9	1,572
Other*	33,026	11.1	3,666
Homicides	21,310	49-70	10,442-14,917
Suicides	27,063	25-37	6,766-10,013
Total	148,219	29-40	42,816-59,708
Overall Total	185,095		61,034-95,003

SOURCE: Data from Nancy Day, *Alcohol and mortality.* Paper prepared for National Institute on Alcohol Abuse and Alcoholism under Contract No. NIA-76-10(P). January, 1977; and National Center for Health Statistics, *Vital Statistics of the United States, 1972, Vol. II:* Washington, D.C.: U.S. Government Printing Office. 1975.

*Includes all accidents not listed above; but excludes accidents incurred in medical and surgical procedures.

has estimated that 247,686 alcoholics died in the United States in 1975, of which 185,690 deaths were estimated to be premature—in excess of general population mortality.

Other estimates of alcohol-related mortality (including nonalcoholics) run as high as 205,000 deaths per year, which was 11 percent of the total 1.9 million deaths in 1975.

Studies of general population samples have also provided information on alcohol-related mortality. When frequency and volume were combined into a frequent heavy drinking scale, males who drank five or more drinks at least four times a week had a mortality rate 2.3 times higher than expected.

International Statistics on Alcohol Abuse

In examining international data, substantial comparability problems often limit analyses of alcohol abuse. However, preliminary results from one recent study indicate that taxes, prices, consumption, and cirrhosis mortality are highly correlated. The highest correlation was found between the per capita level of consumption and the rate of cirrhosis mortality, consistent with other studies. Tax levels and prices were related negatively to consumption, which may reflect a tendency of people in "wet" countries to insist that their governments maintain inexpensive alcohol prices.

Compared to other countries, the proportions of household budgets and private consumption expenditures used to purchase alcohol in the United States are quite low, reflecting the combination of a high living standard and a moderate level of alcohol taxation. However, for alcohol problems involving police enforcement, the United States is in the high range. This country ranks near the median among reporting

nations in hospital admissions for alcohol-related mental illness and is fifth for cirrhosis mortality.

Trends in Problem Drinking

Problem drinking can be defined solely in terms of consumption only when it exceeds some high value. At lower levels of consumption, problem drinking is defined in terms of how alcohol is used and its social and psychological consequences for the drinkers.

Trend data on problem drinking are available for the 2-year period of 1973 to 1975 from analyses of surveys of the general population. Respondents were asked how often they had experienced each of 16 symptoms indicative of drinking problems. Sample symptoms included taking a drink to relieve a hangover, forgetting what one did while drinking, and gulping drinks. These items were combined into an index classifying a problem drinker as one who experienced four or more of these symptoms frequently or eight or more symptoms sometimes. A potential problem drinker was classified as one who reported two or three of the symptoms frequently or four to seven of them sometimes.

Results of the survey analyses (table 6) indicate that 36 percent of all drinkers can be classified as problem drinkers or as persons having potential problems with alcohol (10 percent and 26 percent, respectively). Similar to consumption patterns, combined rates of problem drinkers and potential alcohol problems in June 1975 were substantially less for women (27 than for men (44 percent). No statistically significant trends were found during this 2-year period.

The highest rates of problem drinking occurred among men in the 18 to 20 age group—21 percent. Substantial and steady declines for problem drinking in older age groups were evident; only 6 percent of the men and 3 percent of the women in the group aged 65 and older were problem drinkers. Problem drinking, then, appears to be an issue involving younger adults.

Table 6. Rates of Problem Drinking Among U.S. Drinkers, by Drinking Population, 1973-1975

Drinking Population	Percentages for Each Survey			
	Mar. 1973	Jan. 1974	Jan. 1975	June 1975
All Drinkers				
No problems	64	70	65	63
Potential problems[1]	26	24	24	26
Problem drinkers[2]	11	6	10	10
Males				
No problems	57	66	62	57
Potential problems[1]	29	27	23	31
Problem drinkers[2]	14	8	15	13
Females				
No problems	74	77	70	73
Potential problems[1]	21	19	27	21
Problem drinkers[2]	5	4	3	6

SOURCE: Paula Johnson, David Armor, Susan Polich, and Harriet Stambul, U.S. adult drinking practices: Time trends, social correlates, and sex roles. Draft report prepared for National Institute on Alcohol Abuse and Alcoholism under Contract No. ADM 281-76-0020. July, 1977.

[1]A potential problem drinker experienced two or three of sixteen problem drinking symptoms frequently or four to seven symptoms sometimes.

[2]A problem drinker experienced four or more of sixteen problem drinking symptoms frequently or eight or more symptoms sometimes.

Changes in Problem Drinking During Adult Lifetimes

The degree to which early drinking behavior predicts drinking habits in later life is an important question. A recent report describes the first long-term study in which information was gathered on drinking practices of nearly 1,700 people while in college and 25 years later. Those who were problem drinkers in college were most likely to be problem drinkers and least likely to be abstainers 25 years later. This applies to both males and females. Although the proportion of variation in later drinking status attributable to variation in drinking status 25 years earlier is small, it is reliably above zero for both sexes and larger for males than for females.

Trends in Knowledge and Attitudes Toward Drinking and Alcohol-Related Problems

Trends in Knowledge and Attitudes

It seems likely that attitudes and beliefs about alcohol and problem drinking must change before a person alters his or her behavior patterns. National surveys have included several knowledge and attitudinal indicators, and substantially more change has been observed in these than in the behavioral indicators.

Between 1971 and 1974 or 1975, national survey respondents showed an increasing awareness that alcohol is a drug and that it can be a

Table 7. Economic Costs of Alcohol Misuse and Alcoholism in the United States, 1975

Item	Cost (billion $)
Lost production	19.64
Health and medical	12.74
Motor vehicle accidents	5.14
Violent crime	2.86
Social responses	1.94
Fire losses	0.43
Total	$42.75

SOURCE: Ralph Berry, James Boland, Charles Smart, and James Kanak, *The Economic Costs of Alcohol Abuse and Alcoholism—1975*. Report prepared for National Institute on Alcohol Abuse and Alcoholism under Contract No. ADM 281-76-0016. 1977.

fatal one. People also were correct in their increasing beliefs that there is no cure for a hangover and that coffee and cold showers do not dispel the effects of alcohol.

A decreasing trend was found in the proportion of men and women who know someone whose drinking interferes with work performance. Although the shift is not large—from 47 to 42 percent between 1972 and 1974—it is interesting that no similar pattern is seen in actual drinking behavior. It may be that people have not reduced their drinking, but that drinking and its consequences are occurring less in the job context. This could be the result of expanded occupational alcoholism programing efforts in many large companies (see Chapter X, Occupational Alcoholism Programing).

Most of the changes in attitudes toward drinking involve drunkenness. From 1971 to 1974, people became more critical of drunkenness. More respondents believed that drunkenness is similar to an overdose of drugs, is an indication of alcoholism, and is a sign of social irresponsibility. A shift of similar magnitude was observed for the attitude that "even a moderate amount of drinking is damaging to the body." Impressive changes also were found for several attitudes toward alcoholism, including a change from 50 percent in 1971 to 37 percent in 1975 agreeing that "there is really no cure for alcoholism."

As important as these changes are, their implications must be tempered by the fact that several other important attitudes did not change. Approximately 63 to 69 percent of each survey sample believed that sometimes or usually "drunkenness is a sign of just having fun." Also, a striking 64 to 66 percent claimed that "alcoholism is basically a sign of moral weakness," showing no attitudinal change between 1971 and 1975. Even as some attitudes shift, perhaps because of increased awareness brought about by education and prevention campaigns, other misconceptions remain entrenched in popular belief.

Economic Cost of Alcohol-Related Problems

Alcohol abuse and alcoholism cost the United States nearly $43 billion in 1975 according to a recent study. The estimate was derived from an analysis of six aspects of social behavior in which alcohol had significant economic impact and which are discussed in this section (table 7).

The economic costs of alcohol-related problems are manifested in two general ways: (1) because problem drinking often makes people less functional, society loses a part of the economic value of their normal production; and (2) because certain goods and services such as health and social service resources and police and fire protection have to be increased to cope with some of the consequences of alcohol abuse, the added costs must be paid for by the general public. The market value of all of these resources is an estimate of their economic value in alternative situations. Alcoholism and other alcohol-related problems cause a loss of both production and alternative production, which represents an economic cost to society.

The Second Special Report on Alcohol and Health indicated that the economic costs of alcohol abuse and alcoholism were approximately $25 billion in 1971. On the surface, the increase to $43 billion represents a startling 72 percent leap in only 4 years. However, the higher figure in 1975 is explained by several factors, including the general increase in the cost of goods, services, and labor. Also, the 1975 estimate of $43 billion incorporates a more comprehensive analysis of cost factors than was made for the 1971 estimate.

Lost Production

The largest economic costs of alcohol abuse and alcoholism, $19.64 billion in 1975, involved lost production of goods and services. This estimate includes three components: lost market production among males—$15.46 billion; lost military production—$0.41 billion; and lost fu-

Table 8. Estimated U.S. National Health Expenditures for Alcohol-Related Problems in 1975, According to Type of Expenditures

Type of Expenditure	Total Adult Population Health Expenditures (billion $)	Expenditures Resulting from Alcohol Abuse (billion $)	Expenditures Resulting from Alcohol Abuse as a Percentage of Total Expenditures (%)
Health service and supplies			
Hospital care	42.3	8.40	19.9
Physician's services	17.9	1.30	7.3
Dentist's services	6.2		
Other professional services	1.7	0.12	7.3
Drugs and drug sundries	8.9	0.28	3.2
Eyeglasses and appliances	2.0		
Nursing home care	8.8	0.19	2.2
Expenses for prepayment and administration	3.9	0.78	19.9
Government public health activities	3.0	0.33	13.1
Other health services	2.5	0.39	13.1
Research and medical facilities construction	6.1	0.78	13.1
Training and education	2.3	0.17	7.3
Total	$105.6	$12.74	12.1%

SOURCE: Data from Ralph Berry, James Boland, Charles Smart, and James Kanak, *The Economic Costs of Alcohol Abuse and Alcoholism—1975.* Report prepared for National Institute on Alcohol Abuse and Alcoholism under Contract No. ADM 281-76-0016. 1977.

ture production from excess mortality in 1975—$3.77 billion. Estimates cannot be made on the cost of lost services from nonsalaried problem drinkers such as housewives. The $15.46 billion estimate of lower earnings resulting from alcohol-related problems is an extremely conservative one because losses incurred by working women with alcohol problems and by workers younger than 21 or older than 59 were not included. In addition, the cost of transfer payments, such as unemployment compensation or welfare benefits, is excluded from the estimate.

Health Care

In 1975, approximately $12.74 billion or 12.1 percent of the total adult population health expenditures was spent for alcohol-related health and medical services. This amount represents the second largest economic cost of alcohol misuse, problem drinking, and alcoholism (table 8). Of the $12.74 billion expended for alcohol-related health services, the largest share went for hospital care. As table 8 shows, the total population over 16 years of age, estimated in 1975 at 155 million people, used $42.3 billion worth of hospital care. The estimated 10 million problem drinkers accounted for $8.4 billion or almost 20 percent of all hospital care expenses.

Motor Vehicle Accidents

Economic costs associated with alcohol-related motor vehicle accidents were estimated at $5.14 billion in 1975. The estimated net percentage of several types of alcohol-related crashes ranged as high as 41.5 percent, with the percentage of accidents attributable to alcohol misuse increasing dramatically with the severity of the crash.

Violent Crime

There is not enough evidence to determine how much crime results from problem drinking per se. Therefore, the estimates for violent crime reflect the cost associated with alcohol use. Although the evidence must be interpreted carefully, it indicates a significant relationship between alcohol and crime. The total cost of $2.86 billion estimated for violent crime—homicide, forcible rape, and aggravated assault—is understated, since no estimates were made of unreported crime that might be associated with alcohol.

Also, there was no way to determine the considerable property damage from vandalism, arson, burglary, and other crimes caused by persons under the influence of alcohol.

Fires

The net cost of alcohol-related fires in 1975 was $434.1 million. Problem drinking may contribute to the cause of a fire and may intensify the consequences. There is evidence that alcohol misuse contributes to a number of fire fatalities and burn injuries. This estimate is tentative and reflects only a best approximation based on limited data.

Social Response Systems

The cost of social response systems for alcohol abuse and alcoholism in 1975 was estimated at nearly $1.94 billion. There are two general kinds of government-financed social response programs for alcohol misuse—direct and indirect. Direct programs are established specifically to combat alcoholism and are directed toward detection, prevention, treatment, rehabilitation, research, and education. Indirect programs such as social welfare systems are directed toward alleviating various social problems that may be partly a consequence of alcohol misuse.

The total economic cost of alcohol abuse and alcoholism may well have been lower because of the social responses to it. To the extent that these programs succeed, the economic costs of alcohol-related problems will decrease.

Summary

- Drinking practices are influenced by population characteristics, availability of alcoholic beverages, drinking contexts, and geographical location.

- Increased availability of alcoholic beverages has occurred as a result of the lowering of the drinking age in several States, a trend to longer hours of sale, and an increase in the number of retail outlets.

- Americans generally drink in their own and their friends' homes, although drinking in bars, taverns, and restaurants is most common among 18- to 29-year-olds.

- Since 1971, per capita alcohol consumption in the United States has been the highest since 1850, ranging from 2.63 to 2.69 gallons of absolute ethanol per person 14 years and older. During the 1970's, there has been little change in total per capita alcohol consumption.

- There are an estimated 9.3 to 10 million problem drinkers (including alcoholics) in the adult population—7 percent of the 145 million adults (18 years and older).

- Of adults who drink, 36 percent can be classified as either being problem drinkers or having potential problems with alcohol (10 percent and 26 percent, respectively). Similar to consumption patterns, combined rates of problem drinkers and those having potential alcohol problems are substantially less for women (27 percent) than for men (44 percent).

- In addition to adult problem drinkers, there are an estimated 3.3 million problem drinkers among youth in the 14 to 17 age range—19 percent of the 17 million persons in this age group. (Youth problem drinking is defined differently than for adults, because youth problems tend to be acute rather than chronic.)

- The concern over increased alcohol consumption in youth is heightened by the observation that early drinking behavior predicts drinking habits in later life. Specifically, a recent study showed that those who were problem drinkers in college were most likely to be problem drinkers and least likely to be abstainers 25 years later.

- The rate of total cirrhosis deaths increased by 36.6 percent from 1960 to 1970, followed by a gradual leveling during the early 1970's and a decrease of 6.3 percent from 1974 to 1975. Even though this decrease is encouraging, liver cirrhosis still ranked as the sixth most common cause of death in the United States in 1975, with up to 95 percent of those cases estimated to be alcohol related.

- It is estimated that alcohol-related deaths may run as high as 205,000 per year (11 percent of the 1.9 million deaths in 1975). In

fact, clinical studies consistently show that various types of alcohol problems in males are associated with mortality rates two to six times higher than rates in the general population.

- Studies of international alcoholic statistics demonstrate a high correlation between the per capita level of consumption and the rate of cirrhosis deaths. Preliminary results from a recent study also show that alcohol taxes and prices are related negatively to alcohol consumption.

- Alcohol abuse and alcoholism cost the United States nearly $43 billion in 1975—including $19.64 billion in lost production, $12.74 billion in health and medical costs, $5.14 billion in motor vehicle accidents, $2.86 billion in violent crimes, $1.94 billion in social responses, and $0.43 billion in fire losses.

Chapter II.

Special Population Groups

It has been demonstrated that sociocultural factors influence whether, how much, and why a person drinks. Accordingly, this chapter gives special consideration to drinking and problem drinking in six special populations and to the implications of their particular characteristics for alcoholism prevention and treatment.

Alcohol Use and Abuse Among Youth

An analysis of 120 surveys of American teenage drinking practices from 1941 to 1975 indicates that the proportion of drinkers rose steadily from World War II until approximately 1965. That proportion has remained relatively constant since then, and more than 70 percent of today's teenagers have had a drink. Teenagers typically have their first drink at age 13, and 7 percent more males than females in the teen years have had a drink, a decrease from the 17 percent difference occurring between 1941 and 1965.

The proportion of high school students who reported ever having been drunk increased dramatically from 19 percent before 1966 to 45 percent between 1966 and 1975. The proportion reporting being intoxicated at least once a month rose from 10 percent before 1966 to 19 percent between 1966 and 1975.

Recently, a national survey of students in grades 7 through 12 examined teenage drinking and problem drinking. Seventy-four percent of the teenagers were drinkers—79 percent of the boys and 70 percent of the girls. Problem drinking was defined either as drunkenness at least six times in the past year; or presence of negative consequences from drinking two or more times in at least three of five specified situations in the past year or both. The negative consequences that students acknowledged were a result of drinking were (1) getting into trouble with teachers or the principal, (2) getting into difficulties with friends, (3) driving when having had a "good bit" to drink, (4) being criticized by someone the student was dating, and (5) getting into trouble with the police. By this definition nearly 19 percent of the students were problem drinkers—23 percent of the boys and 15 percent of the girls. As shown in figure 1, the proportions of both teenage drinkers and teenage problem drinkers increased steadily with each succeeding grade for both boys and girls. While 5 percent of the 7th grade boys and 4.4 percent of 7th grade girls were problem drinkers, nearly 40 percent of 12th grade boys and 21 percent of 12th grade girls were problem drinkers. The largest increase in problem drinking occurred between the 7th and 8th grades for boys—from 5.0 to 15.6 percent, and between the 8th and 9th grades for girls—from 9.1 to 16.2 percent.

Drinking among college students has been rising steadily since 1936. Today's collegians drink more frequently and become intoxicated more often than today's high school students.

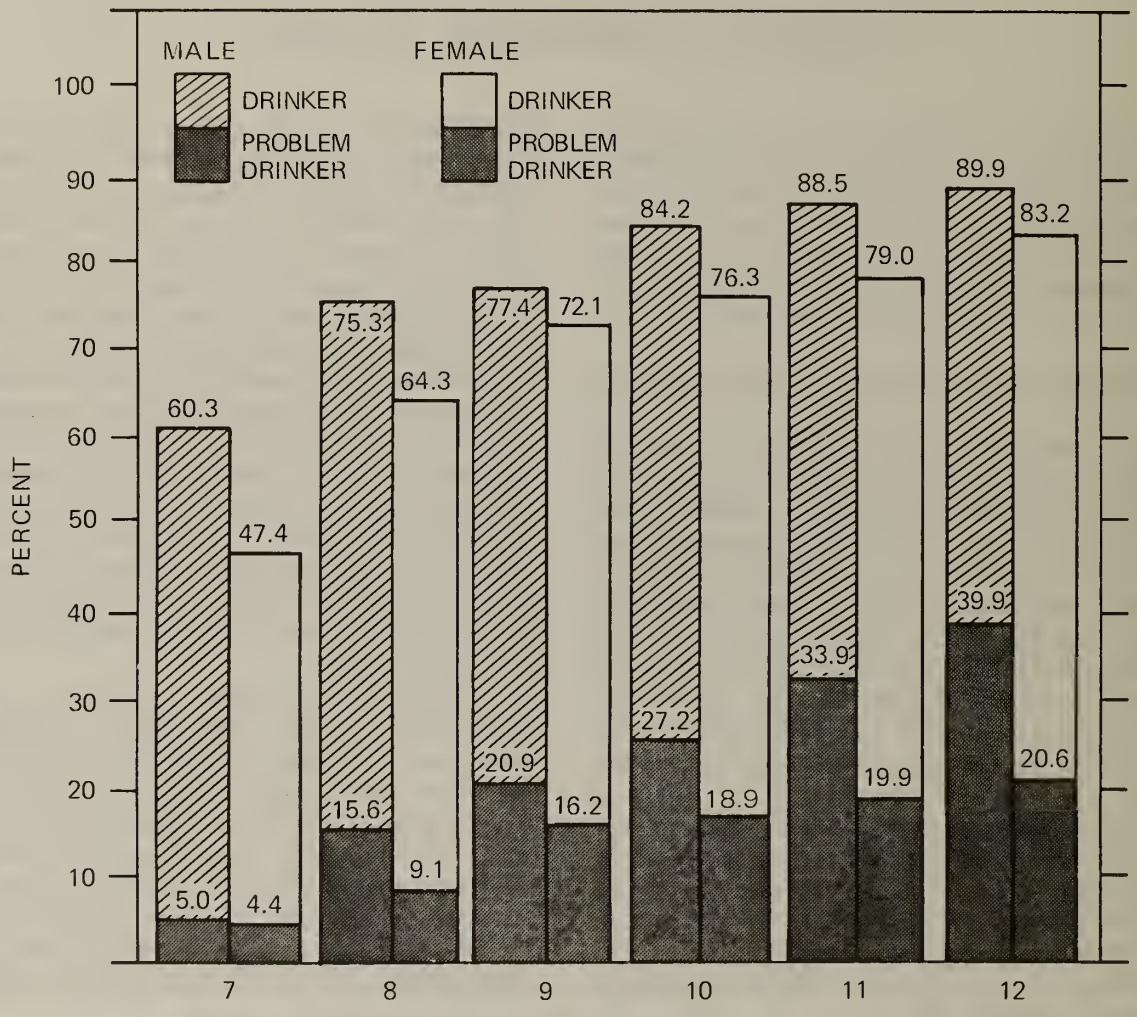
Young people drink less regularly than older people but tend to consume a larger amount on a drinking occasion. The risk of incurring negative consequences associated with the acute effects of alcohol are higher in late adolescence and early adulthood than at any other point in the lifespan.

Factors Influencing Youthful Drinkers

Researchers have concluded that six major factors influence high school drinking: peer, familial and parental, sociocultural, environmental-contextual, personality, and behavioral. Peer and parental influences are considered the most critical because of the high correspondence between the drinking practices of adolescents and those of their parents and peers.

Direct relationships are demonstrable between parental attitudes and behaviors toward alcohol and adolescent drinking behavior. Heavi-

Figure 1. Drinking and Problem Drinking by Sex and Grade in School



SOURCE: Data from John E. Donovan and Richard Jessor, Adolescent problem drinking: Psychosocial correlates in a national sample study. *Quarterly Journal of Studies on Alcohol* in press.

er drinking by the parents often predicts problem drinking by their children. Regular drinking by the parents, especially if at home with meals, sets an example that their children typically begin to imitate during high school years. Smaller amounts of alcohol are consumed on drinking occasions when adults are present than when they are absent.

Although youth do not often admit that they drink to conform to peer pressures, a high degree of congruity exists between the drinking behaviors and attitudes of adolescents and their peer groups. The influence of peer groups on adolescent drinking, however, may be due more to desire for social conviviality than for peer conformity.

Sociocultural characteristics of residence in an urban area, broken home, poor parent-child relationship, socioeconomic status—although less influential than the other factors—and Jewish religious affiliation are related positively to the prevalence of alcohol use. Several studies, however, indicate that Jewish adolescents have lower rates of heavier or problem drinking than do Roman Catholic or Protestant adolescents.

Studies of environmental-contextual influences on teenagers and drinking show that beer is the favorite beverage of adolescents, that the home is the most frequent setting for the consumption of alcoholic beverages, and that peers are the adolescent's most typical drinking companions.

The behavioral variables of church attendance, religious involvement, and academic achievement apparently predispose adolescents against alcohol use. Although the proportion of drinkers among young delinquents is only slightly higher than among control groups, delinquency is associated strongly with heavy drinking and with misbehavior while intoxicated. Delinquents usually have their first drink with companions rather than with adults, and without parental permission.

Personality factors that apparently predispose toward teenage drinking include alienation, tolerance for deviation, and personal dissatisfaction. The association between drinking and pathology is inconsistent since drinking at an early age often constitutes normal, adaptive behavior for many individuals and social groups. However, frequent drinking and severe intoxication by youths relate consistently with social and individual pathology.

Theories on Drinking and Youth

Researchers studying the development of adolescent drinking behavior generally agree that such behavior is learned; is strongly subject to both positive and negative parental influences; and serves as a method for coping with the anxiety, frustration, and conflict inherent in puberty and adolescence. It is worth noting that although there is an alarming number of alcohol-related problems among youth, not all youth who drink experience related problems.

Some investigators explain adolescent drinking as the interplay of personality and social variables. Heavy and problem drinking in adolescence is seen as antisocial behavior with roots in disturbed affectional relationships within the family. A related explanation is that teenage drinking is learned behavior, to be understood within its social and cultural context. This view regards parents as the principal agents of socialization with regard to the development of attitudes and predispositions about alcohol and drinking, and refutes the theory that adolescents are compelled to drink because of irresistible peer pressure.

Another set of investigators has noted that the likelihood of drinking seems to be related directly to the pressures of transition into adulthood, so that a developmental relationship exists between the onset of drinking and other sociopsychological attributes. These investigators have proposed that all behavior is determined by the simultaneous operation of personality and sociocultural variables. Behavior can be considered as deviant according to the extent to which it departs from social norms and evokes a corrective social response. These investigators determined that people who theoretically were expected to exhibit deviance on the basis of sociocultural and personality measures more often consumed alcohol to solve problems and to change behavior. Such people consumed more alcohol and became intoxicated more frequently than did individuals who were expected to be less likely to engage in deviant behavior. Empirical support for this formulation has been fairly strong and consistent.

Drinking appears to be an integral part of general adaptation to self, others, and circumstances, rather than an isolated or capricious activity. Therefore, any attempt to understand problem drinking must be made within the

framework of a total syndrome, a class of problem behavior.

Alcohol Use and Abuse Among Women

Conservative estimates of the number of adult women with alcohol-related problems range from 1.5 million to 2.25 million. Many people believe that the latter figure, based on data from national household surveys, may underestimate the extent of the problem because of the widespread use of male-oriented problem drinking measures. Others believe that underestimation results from the greater social stigma associated with female alcoholics that may prevent women from entering treatment.

Fewer women drink than men, and among those women who do drink, the incidence of heavier and problem drinking is considerably lower. Moreover, for women as a group, there has been no apparent increase in heavier or problem drinking during the early 1970's, although this does not eliminate the possibility of an increasing trend during an earlier period. Nonetheless, there is continuing concern regarding the extent of alcoholism and alcohol-related problems among women, especially as women's status and roles evolve to meet new social conditions. The fact that nearly all younger women drink stands in stark contrast to the dominant pattern of abstention among older women, and is undoubtedly a 20th-century phenomenon. This higher rate of drinking raises the risk of exposure to alcohol abuse and could be a precursor to an increase in women's drinking problems in the future.

Given these concerns, there is considerable interest in the social factors that contribute to alcoholism among women, and in whether these social factors are related to broader changes occurring in women's roles. In particular, a central question is whether the extension of women's roles to include traditional male roles will increase or reduce alcohol-related problems among women.

Social Factors

Although many social factors determine a woman's lifestyle, among the most important are age, marital, employment, and socioeconomic status. Some of these factors may also influence drinking behavior.

One recent study has shown that the proportion of women who drink drops considerably with increasing age regardless of other social factors. However, there is a higher incidence of heavier and problem drinkers in the 35 to 64 age group than in either the younger or older age groups. The sole exception to this pattern occurs for divorced and separated women in the under-35 age group.

The effect of marital status varies with the age group. Among women under 35, there is little difference between single and married women, but divorced and separated women have the highest incidence of heavier and problem drinking of any group. However, where comparisons are possible, the older women who are divorced, separated, and widowed show lower problem rates than those who are married. Since the divorced status is likely to be more recent for the younger woman than for the older one, the study suggests that the crisis of divorce or separation, rather than the status of being divorced, is responsible for the elevated rates of heavier and problem drinking for younger women.

Among married women under 65, those who are working have higher rates of heavier and problem drinking than those who are not employed outside the home, regardless of socioeconomic status. This finding may stem from peer pressures in the working situation to drink more frequently, accompanied by few inner constraints not to do so. An alternative explanation associates elevated rates with conflicts stemming from the dual demands of the roles of wife and employee.

Sex Roles

The study just described also has suggested that lifestyles can be categorized into how much or how little they exemplify traditional ideas of women's roles. Traditional American role expectations for a woman have included being a wife and mother and, if she works, a secretary, nurse, or teacher Nontraditional roles include being single, childless, or having a career such as business executive or lawyer. A woman who breaks with tradition is generally exposed to societal pressures to conform, and some drinking patterns may emerge as a reaction to this role conflict.

A sex role index was devised to classify women 30 to 64 years of age into in-role and out-of-role groups. To be out of role, a woman had to

be nontraditional on at least three of the five criteria. The results, comparing the two groups, indicated that in-role women are more often drinkers, but out-of-role women who drink are more often heavier and problem drinkers, regardless of socioeconomic status. Another study showed that for women in traditional female occupations, personal sex-role characteristics were the most significant predictors of higher levels of drinking. For women in traditionally male occupations, the level in the organization and salary were the sole predictors of higher drinking levels.

Attempts to define a typical female alcoholic personality have been disappointing. Only a poor self-concept and low self-esteem have been found as identifiable traits. Women alcoholics are in many ways a heterogeneous group who nonetheless frequently had an alcoholic parent.

Barriers to Treatment

It is not surprising that until recently alcoholic treatment programs were ill equipped to deal with women alcoholics. Historically, women have received low priority attention in nontraditional areas, thereby establishing a cultural protective device for women who are problem drinkers. Families and medical professionals frequently have tended to disguise female alcoholism under less embarrassing diagnoses, effectively eliminating treatment. Another barrier to treatment is the well-documented fact that women, who spend more time at home than men do, tend to drink at home alone—therefore less visibly.

Encouraging signs for women's treatment do exist. More women are entering treatment, and initial studies of posttreatment behavioral changes indicate positive prognoses in many cases.

Alcohol Use and Abuse Among the Elderly

A significant number of people 60 years old and older have problems with alcohol. Up to 10 percent of the general elderly male population are problem drinkers, and approximately 10 percent of alcoholics in treatment are age 60 or older. In contrast, only 2 percent of the elderly female population are heavy or problem drinkers.

Surveys of national samples from 1971 to 1975 show drinkers among those 65 years and older to be 48 percent of the men and 32 percent of the women. These percentages were appreciably lower than for the next younger category of 50 to 64 years. No consistent trend was seen during the 5-year period.

Although alcoholism afflicts a lower proportion of people during old age than at earlier stages of life, many elderly people need treatment. Physical or mental disabilities caused by chronic, excessive drinking result in admission of a high proportion of current or former alcoholics to acute medical wards of general hospitals.

Loneliness, loss of spouse, physical or emotional separation from children, ill health, and lack of purposeful employment or other meaning to life all can precipitate alcohol problems in the elderly. Elderly people who become alcoholics late in life have a better response to treatment than those who were alcoholics in their earlier years.

Barriers to Treatment

Diagnostic problems constitute perhaps the greatest barrier to treatment of alcoholic senior citizens. What is perceived as frailty, senility, or simply the unsteadiness of old age may in fact be alcoholism. Relatives, friends, and service professionals working with the elderly may be reluctant to acknowledge the need for alcoholism treatment. In addition, social agencies for the aged usually are poorly equipped to treat alcohol problems, and many alcohol treatment centers are geared to a younger clientele.

Alcohol Use and Abuse Among American Indians

Among all special population groups in the United States, American Indians have been attributed the highest frequency of problems associated with drinking. However, because of difficulties in cross-cultural data collection and interpretation, the variety of cultural groups included as "American Indians," and the preponderance of anecdotal rather than definitive studies, accurate estimation of the prevalence of alcohol-related problems has been difficult. Impressions of problem-drinking rates are mainly inferred indirectly from the high incidence among Indians of other misfortunes in which alcohol is believed to play a role. For example,

Indians are arrested for public drunkenness and for crimes associated with alcohol much more frequently than members of the general population. In addition, they experience higher death rates due to liver cirrhosis, accidents, suicide, and homicide—all of which appear to be accompanied frequently by alcohol intoxication.

"Why Indians drink" has been widely addressed by the research literature. The "firewater" myth, that Indians are predisposed genetically to pathological responses to alcohol, has become thoroughly entrenched in folk wisdom despite the lack of any scientific basis for the assertion. Currently, social and cultural explanations for high rates of problems with alcohol are predominant. Social factors include current, long-standing societal conditions (such as unemployment, low income, inferior education, isolation, discrimination), poor health, and thwarted social and economic goals. Cultural explanations of Indian drinking behavior are varied and contradictory. Such explanations range from a claim that moderate intoxication is a substitute for lost traditions to the assertion that drunkenness relieves the anxieties and frustrations caused by the competition between historical tradition and pressures for integration into the dominant culture. The descriptive studies which characterize the literature on Indian drinking have increased our knowledge of alcohol-related problems. However, much work needs to be done to assess the prevalence and nature of alcohol-related problems for American Indians with specific attention to tribal and sociodemographic differences.

Barriers to Treatment

The cultural and traditional norms that have reinforced Indian drinking patterns have often served as barriers to treatment. Western psychiatric approaches and the traditional Alcoholics Anonymous (AA) approach have sometimes been called inadequate for dealing with Indian problem drinking. Objections to the AA approach included dislike of public discussions of personal problems and dominant society religious overtones, exclusion of nonalcoholics, attempts to influence other people's behavior, and especially the requirement of abstinence. However, it appears that AA has been successful with Indians when the approach has been "Indianized," that even the traditional AA approach is successful in some situations. The conscious or unconscious discrimination and lack of understanding by Anglo staff have often been cited as interfering with treatment. Where Indian programs have been largely self-determined, many positive benefits have been cited. Fortunately, flexible policies governing Indian alcohol programs have allowed many innovations in services to the problem drinker and those he affects. Although little evaluation has been done in the past, the evaluation of Federal alcoholism programs for Indians is beginning and should provide the basis for future activities of the Indian Health Service and NIAAA in the treatment of alcoholism for the Indian population.

Alcohol Use and Abuse Among the Spanish-Speaking

The Spanish-speaking population of the United States is the second largest ethnic minority group. It consists of 11.1 million people representing a number of subgroups that differ significantly in national origin and culture.

Lack of homogeneity even within subgroups is a complicating factor in attempting to place research findings into perspective. Members of Spanish- speaking subgroups vary considerably in educational level, occupation, income, health, and degree of acculturation. Not unexpectedly, most of the research on problem drinking has focused on Mexican Americans, the largest subgroup; proportionately less research was conducted among Puerto Ricans and the remaining subgroups.

National and regional studies of American drinking indicate that the extent of problem drinking tends to be greater among the Spanish-speaking population than among the general population. Alcohol-associated arrest and mortality data tend to support these findings, although such data for population subgroups should be examined with caution. Other indicators of widespread problem drinking among the Spanish-speaking include above-average concentrations of alcoholic beverage retail outlets and high ratings of alcoholism as a community problem.

Problem drinking among the Spanish-speaking may be due in part to acculturation stress. High rates of drinking were associated with high acculturation and lack of opportunities for economic success. Those low in acculturation did not drink heavily whether or not they had opportunity for economic success.

Studies of drinking among high school and college students, while containing limited data on the Spanish-speaking, imply that this group has a higher percentage of abstainers than the general student population. Furthermore, Puerto Rican and Mexican American young and adult women are predominantly nondrinkers.

Barriers to Treatment

Barriers to treatment for alcoholism among the Spanish-speaking include a formidable array of cultural and environmental factors, which may explain why Mexican Americans and Puerto Ricans seek treatment less often than do individuals in the general population.

For one, both subgroups are less likely to perceive alcoholism as an illness requiring special treatment. Second, Mexican Americans reportedly avoid "the system" because of lack of facility with English, fear of discovery of illegal alien status, and fear of discriminatory treatment in an Anglo environment. Third, Mexican Americans are more likely to see alcoholism as a moral weakness. They are also less familiar with treatment resources than are Anglos. Finally, the family pride and support that are important qualities of the Spanish-speaking cultures can become barriers to timely, effective treatment when alcoholism exists within a family unit. Pride often fosters the denial of a drinking problem, and family support often results in the excusing of alcoholic disruptive behavior.

The highly distinctive pattern of residential separation that characterizes Spanish-speaking communities should greatly simplify the problem of locating the target group for alcoholism prevention and treatment. This pattern should also facilitate the development of culturally specialized treatment services staffed with Spanish-speaking persons similar to the clients in cultural origin, a need cited by many treatment administrators.

Alcohol Use and Abuse Among Black Americans

Black Americans constitute the largest ethnic minority group in the United States. Although black Americans have been represented in national surveys of drinking practices and problems, they seldom have been the focus of research designed to analyze alcohol use and abuse in terms of their cultural norms, values, and beliefs. Nor have the cultural variables that distinguish black subgroups from one another been differentiated.

National surveys conducted in the 1960's indicated some differences in the drinking patterns of black and white men: 38 percent of black men were abstainers compared to 31 percent of white men, and 19 percent of black men were heavier drinkers compared to 22 percent of white men. Among black women, 51 percent were abstainers compared to 39 percent of white women. In contrast, 11 percent of black women who drank were heavier drinkers, compared to 4 percent of white women who drank.

Alcohol appears to play a role in influencing crime in urban and rural black communities. Blacks are more likely than whites to be victims of alcohol-related homicide. Some researchers attribute the apparently disproportionate devastation caused by alcoholism in the black community to the widespread "ghettoization" and victimization of blacks in the United States. This situation is seen as separating and alienating many blacks from the common goals, purposes, and rewards of the larger society.

Barriers to Treatment

A major barrier to treatment of alcoholism among blacks has been the lack of development of culture-specific treatment programs for black alcoholics. Further research could center on specific areas of investigation, including the patterns of alcohol use, social context of that use, definitions of alcohol abuse, and help-seeking patterns among blacks. There is also a need for data concerning middle and upper class blacks.

Summary

- The characteristics that distinguish special population groups from the dominant culture and from each other also frequently are involved in the development of alcohol use and abuse among those groups. For this reason, youth, women, the elderly, the Spanish-speaking, American Indians, and black Americans, among others, should be considered discrete sociocultural units with unique needs for prevention and treatment.

- Since World War II, alcohol consumption among youth increased steadily to a level of 70 percent in 1965 and has not changed

substantially since then. Teenagers typically have their first drink at age 13, with girls now trying alcohol almost as often as boys during the teen years.

- Results from analysis of a 1974 survey of high school students showed that problem drinking increases from 5 percent in the 7th grade to 40 percent in the 12th grade for boys, and from 4 percent in the 7th grade to 21 percent in the 12th grade for girls. The proportion of high school students who reported ever having been drunk increased dramatically from 19 percent before 1966 to 45 percent between 1966 and 1975. The proportion reporting being intoxicated at least once a month rose from 10 percent before 1966 to 19 percent between 1966 and 1975.

- Conservative estimates of the number of adult women with alcohol problems range from 1.5 million to 2.25 million. Among women, social factors are predictive of drinking practices. For example, under age 35, those who are divorced or separated have the highest incidence of heavier and problem drinking. Among married women under 65, those who are working have higher rates of heavier and problem drinking than those who are not employed outside the home, regardless of socioeconomic status. Women who are not employed and who have drinking difficulties remain overlooked by society.

- Although both drinking and problem drinking among the elderly are less prevalent than in younger populations, a significant number of people 60 years and older have problems with alcohol. Up to 10 percent of the general elderly male population are problem drinkers, and approximately 10 percent of alcoholics in treatment are 60 or older. In contrast, only 2 percent of the elderly female population are heavy or problem drinkers. Failure to diagnose drinking problems is the greatest barrier to treatment of senior citizens.

- Among all special population groups in the United States, American Indians have the highest reported frequency of problems associated with drinking. The cultural and traditional norms that have reinforced Indian drinking patterns also have served as barriers to treatment.

- The extent of problem drinking tends to be greater among the Spanish- speaking population than among the general population. Acculturation stress may be partly to blame for high rates of alcoholism. Spanish-speaking people seek treatment less often than do individuals in the general population, partly because of cultural and envionmental factors.

- A smaller proportion of black females than white females drink alcohol, but those black females who do drink have a greater proportion of heavier drinkers. Among black males, the rates of both drinking and heavier drinking are slightly less than for white males.

Chapter III.

Biomedical Consequences of Alcohol Use and Abuse

Research on alcohol abuse and alcoholism may be divided into two general areas: (1) the etiology, or causes, of alcoholism, including genetic predisposition, human alcohol metabolism, and central nervous system tolerance to and dependence on alcohol; and (2) the morbidity that results from the excessive use of alcohol. Research into the pathologic consequences of alcohol abuse and alcoholism is particularly important given their heavy social and economic costs to the society. This chapter focuses on recent advances in the understanding of the mechanisms by which alcohol functions in the development of disease. It also reviews the biochemical and neurochemical alterations in central nervous system function, which may contribute to the etiology of alcoholism.

Alcohol and the Gastrointestinal Tract

Esophagus

It is clear that alcohol can damage the esophagus by direct chemical irritation to its mucosa (interior lining), by inducing severe vomiting that tears the mucosa, or by interfering with normal motor functions, thereby causing an upward movement of stomach acid into the esophagus where it can erode the tissue. The major complication in these processes is hemorrhage, accompanied or preceded by local pain and difficulty in swallowing.

Stomach

Gastric damage as a result of alcohol ingestion was first observed by Beaumont in 1833 in a patient whose recovery from a gunshot wound left a permanent opening in his abdominal wall. The opening led to the interior of the stomach, through which Beaumont could study the effects on the stomach lining of various ingested substances. Alcohol caused acute gastric damage accompanied by bleeding.

Alcohol subsequently has been shown to be widely associated with a variety of inflammatory and bleeding lesions of the stomach. The degree of the damage it causes to the stomach lining appears to be related to alcohol concentration, with damage to the cells occurring rapidly after alcohol ingestion.

While the effects of alcohol on stomach tissue are well known, the actual mechanism of damage has not yet been established. The prime suspect is stomach acid. However, investigators have found varying results in experiments involving the effects of chronic and acute alcohol intoxication on the levels of acid secretion.

Small Intestine

Digestive disturbances in the small intestine are common in alcoholics. Acute administration of alcohol leads to changes in intestinal motility. In the jejunum (the division of the small intestine below the duodenum), impeding peristaltic waves are decreased by alcohol and propulsive waves are unchanged, resulting in an increased rate of propulsion through the small intestine. This effect is seen as a possible contributing factor to the diarrhea frequently experienced by binge-drinking alcoholics.

Intestinal malabsorption may also result from alcohol ingestion, but the degree is determined by the compound to be absorbed, the amount of alcohol, and the method of alcohol administration. Calcium malabsorption may result from direct effects of alcohol on the duodenum. The thiamine deficiency common in alcoholics, only partly the result of malabsorption, is also produced by inadequate diet, decreased conversion of thiamine to its biochemically active form, and impairment of thiamine storage in the

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liver. Chronic alcohol administration is said to lead to a decrease in absorption of iron and vitamin B_{12}, while acute administration inhibits the absorption of amino acids.

Depending on the level of alcohol ingested or administered, alcohol also can damage cells and derange cellular metabolism in the small intestine. Enzyme systems involved in carbohydrate metabolism are impaired, and activity of enzymes involved in the uptake and metabolism of lipids is increased. Enzymes involved in cholesterol synthesis are also affected.

Pancreas

Alcoholism is associated with a significant increase in the incidence of pancreatitis, a chronic inflammation of the pancreas. Most researchers believe that the disease-causing mechanism is the alcohol-induced increase in protein concentration in pancreatic juice, thought to precipitate and form obstructive plugs in the ducts of the organ. While acute alcohol ingestion does not appear to be associated with pancreatitis, it can interfere with pancreatic secretion of digestive enzymes that might account for some of the abnormalities in intestinal absorption associated with alcoholism.

Alcohol and the Liver

The liver is the largest and metabolically most complex organ in the body. It is functionally involved in circulation, excretion, immunology, metabolism, and detoxification, all of which are affected by the presence of alcohol in the body. The organ is the first recipient of digested products and other substances absorbed from the gastrointestinal tract, and also receives substances from general circulation through the hepatic artery. Although it is the primary site for detoxification of alcohol, the liver can be damaged by alcohol and its metabolic products.

Alcohol has a number of metabolic effects on the liver. For one, it inhibits the conversion of amino acids to glucose , a major energy- producing fuel in the body, when the liver's store of glucose is low (as is often the case in poorly nourished alcoholics). The resulting hypoglycemia is similar to the condition of reduced blood sugar seen in diabetics who have taken too much insulin.

Another metabolic consequence of heavy alcohol ingestion is alcoholic ketoacidosis, which resembles diabetes by producing excess blood acidity. The excessive breakdown of fatty acids in both conditions causes a buildup of intermediate breakdown products that back up into the bloodstream, causing toxic effects. These fatty acids are mobilized from fat stored throughout the body by increased release of growth hormone, epinephrine, glucagon, and cortisol.

Still another consequence is the inhibition of the conversion of amino acid into certain important proteins manufactured by the liver. Included are albumin, transferrin, complement, and several others involved in blood coagulation.

At the same time, alcohol can also stimulate hepatic synthesis of certain other proteins, including lipoproteins, which transport fats in the blood. This effect may explain the elevated blood triglyceride (fat) levels frequently seen after alcohol ingestion. The alteration in fat metabolism may result in a gradual accumulation of fat in the liver and cause a "fatty liver." This condition can cause liver failure and death, particularly in younger people.

Hepatic Alcohol Metabolism

The liver plays a key role in alcohol metabolism via three hepatic enzyme systems. The first, alcohol dehydrogenase (ADH), accomplishes the greatest percentage of this function. When ADH catalyzes the oxidation of ethanol to acetaldehyde, the cofactor $NAD^+$is reduced to NADH by hydrogen from ethanol. NADH can then be reoxidized directly to NAD^+in other reactions in the cell for reuse in the ADH reaction.

In the second system, catalase can oxidize ethanol in vitro in the presence of H_2O_2 generating systems. Normally only a small percentage of ethanol metabolism occurs via this enzyme.

The third is the microsomal ethanol oxidizing system (MEOS), characterized by increased metabolic activity after chronic, heavy alcohol consumption. The evidence that MEOS may be a major mechanism for the acceleration of ethanol metabolism at a high ethanol concentration in rats indicates to researchers that a similar function might exist in humans who chronically drink heavily.

Some researchers believe that a fourth mechanism may emerge from the discovery that humans have multiple forms of ADH with varying affinities for alcohol. As body alcohol levels alter, so do the roles of high- and low-affinity isoenzymes, resulting in an increase in

the amount of functioning ADH at high alcohol levels and the subsequent faster metabolism of ethanol at high levels of ingestion.

Regardless of the enzyme involved, the nutritional status of the drinker is a highly important factor affecting hepatic alcohol metabolism. Starvation and low protein intake retard the process mainly by affecting the ADH system. The rate-limiting factor in the metabolism of alcohol is either the capacity of the liver to reoxidize the NADH produced by the reduction of NAD^+ or the level of the enzyme itself, depending on the condition. Inadequate protein in the diet reduces the amount of ADH to the point where the enzyme becomes the rate-limiting factor, while fasting and malnutrition reduce the rate of NADH reoxidation. Therefore, the higher and more sustained blood alcohol levels seen in malnourished alcoholics could be caused by either of these mechanisms.

The Hypermetabolic State

Regular drinkers of very large amounts of alcohol may obtain at least half of their calories from the drug. These people can metabolize alcohol faster than normal individuals, and their overall metabolic rates seem to be accelerated. The resulting hypermetabolic state is similar to hyperthyroidism, with both conditions characterized by a high metabolic rate, increased oxygen consumption, inefficient use of calories, increased heat output, and weight loss. Indeed, some researchers postulate that both states are created by the same mechanism, which includes increased hydrolysis of adenosine triphosphate (ATP). Some researchers have reported that the increased oxygen demand that heavy alcohol consumption creates may be reversed by propylthiouracil, a drug often used to treat hyperthyroidism.

An alternative theory holds that the hypermetabolic state may arise as a consequence of alcohol oxidation via the MEOS pathway in alcoholics. Because the MEOS converts ethanol to acetaldehyde without coupling to produce ATP, the result would be a loss of chemical energy from both ethanol and the cofactor NADPH, increased oxygen use, and overall loss of body efficiency through strain on the metabolic system.

Hepatic Diseases

Alcoholic hepatitis is a major life-threatening complication of heavy chronic alcohol consumption, and may be a precursor stage of cirrhosis. The production and progression of the disease is influenced by tissue lymphocytes, which invade the liver in an apparent immunologic allergic reaction of individuals to their own hyaline. This reaction appears to continue even when patients give up alcohol because the preexisting hyaline bodies remain in the liver.

Cirrhosis is a chronic inflammatory disease of the liver in which functioning liver cells are replaced by scar tissue. In Western countries it occurs most frequently in alcoholics. Although alcoholic hepatitis may be a precursor stage of cirrhosis, it also has been shown that alcohol by itself can produce fibrosis, and perhaps even cirrhosis, without any antecedent stage. Individual susceptibility to the disease may be related to genetic and other factors in addition to heavy chronic alcohol consumption, since not all alcoholic individuals develop the disease.

Studies in recent years with baboons as animal models have clearly disproven the hypothesis that cirrhosis in man is a disease caused by nutrient deprivation rather than induced by alcohol. These alcohol-exposed animals developed cirrhosis even though they were fed more than adequate diets.

Effect of Liver Disease, Drugs, and Heredity

The experimental procedures used to study the effects of liver disease, drugs, and heredity on alcohol metabolism produce conflicting reports, because often it is difficult to pinpoint which of many factors are responsible for changes in the rate of alcohol clearance. For one, the acceleration of ethanol metabolism rates seen in chronic alcohol consumption disappears in the presence of severe liver disease, and these rates may even fall below normal in cases of very severe liver disease. Also, individual and ethnic differences in the rate of ethanol clearance apparently exist, based in part on genetic factors. These factors could influence susceptibility to alcohol-induced liver disease and modify the effects of other drugs on alcohol metabolism. Additional problems arise from the varying effects of drugs on hepatic alcohol metabolism.

Alcohol and the Nervous System

Brain nerve cells generate and conduct electricity, transmitting information to an adjacent nerve cell by the release of specific chemicals called neurotransmitters. The receiving cell provides feedback to the transmitting cell regarding the message sent. Each cell can receive and integrate information from many others, a function that alcohol can alter.

Electrical currents in nerves are transmitted from the membrane of the nerve cell to the inner cell. This mechanism is closed when the resistance of the cell membrane is reduced at any point, resulting in electrical charges carried by sodium and potassium ions flowing across the membrane in a movement called the action potential. Alcohol impairs the opening of the mechanism, so the nerve has difficulty refiring.

Neurophysiologic studies have shown that ethanol inhibits the sodium current in the action potential. This impairment is most effective in small diameter nerves such as those in the human central nervous system, and occurs to a significant degree from alcohol in concentrations comparable to those resulting from drinking.

It has long been known that alcohol belongs to a large group of chemically unrelated general depressants that can produce central nervous system depression and anesthesia. Each of these substances induces narcosis when it attains a certain molar concentration in the lipids of the cell. These substances expand the surface of the cell membrane and disorganize membrane constituents in both red blood cell and brain synaptosomal membranes. Apparently this volume increase is responsible for the narcosis. In lower animals, anesthesia produced by these general depressants can be reversed by compressing the membrane back to its original volume with high pressures.

In addition to impairing the action potential, acute ethanol administration produces other membrane alterations. It inhibits membrane-bound enzymes required to produce an asymmetrical distribution of sodium and potassium ions in the nerve and, even in low concentrations, reduces the number of sulfhydryl groups that can react readily with sulfhydryl binding agents. In chronic ethanol treatment, increases in lipid synthesis, sulfhydryl group exposure, and choline transport are seen. Further studies should reveal how these altered membrane properties translate into altered physiologic functions in the cell.

Tolerance and Physical Dependence

Chronic alcohol intake produces tolerance and can produce physical dependence in both humans and experimental animals. Alcohol tolerance refers to its reduced effectiveness after repeated intake. Physical dependence refers to a set of specific physiologic disturbances that occur when alcohol is withdrawn and are alleviated when alcohol intake is resumed. Research with animals indicates that learning probably is not involved in the development of tolerance, and that tolerance is produced by impairment of certain neuronal systems.

All existing models of physical dependence include tolerance as part of the dependence-producing mechanism. It is generally assumed that physiologic mechanisms affected by alcohol are regulated by feedback mechanisms that compensate for altered function if the exposure to ethanol is continued. This compensatory action reduces the drug's effect and tolerance develops. However, alcohol is an essential part of this condition and is required for the continuance of normal function. Consequently, if alcohol is withdrawn abruptly, the biologic systems that depend on it cannot revert quickly enough to their basal activity, and the withdrawal syndrome appears.

Recently, this traditional model has been challenged by research findings indicating that pharmacologic destruction of certain brain neurons abolishes the development of tolerance to some effects of alcohol but does not affect the development of physical dependence. Despite the fact that a dissociation between tolerance and dependence may simply reflect adaptations in neuronal pathways, this discovery may lead to important conceptual advances.

Effects of Alcohol on Brain Energy Metabolism

Most changes produced by alcohol on brain energy metabolism and metabolite levels probably reflect its effects on the electrical properties of nerve cells, even though the significance of these changes is uncertain. In concentrations pertinent to in vivo studies, alcohol does not affect energy metabolism or the rate of oxygen use by electrically inactive nerve cells. If, however, brain tissue is stimulated electrically, the rate of cellular consumption of oxygen is doubled, and alcohol inhibits use of this extra oxygen. This

inhibition occurs because of the reduction of ion movements in the action potential and the alteration of the enzymatic mechanism by which sodium and potassium ions are pumped back to their original positions and concentrations. These changes may explain the inhibitory effect of intoxicating doses of alcohol on oxygen consumption in the human brain.

Reversal of Alcohol's Effects on the Nervous System

Despite the well-known depressant effects of alcohol on the central nervous system, including its capacity to lead to coma and even death when consumed, no effective antidotes for acute intoxication now exist. Researchers are interested in developing an amethystic (sobering) agent to abort or mitigate alcohol's depression of central nervous system functions by reversing the acute effects of alcohol intoxication. Such an agent would be highly valuable in the treatment of medical emergencies, specifically as they may relate to overdosage. In the development of such an agent, various factors will have to be considered, including ease and speed of administration, course of action, negative side effects, and potential for abuse.

Recent research in the fields of neurobiology and neuropharmacology indicates that pharmacologic stimulation of noradrenalin can reverse some of alcohol's acute effects. Propranolol, for example, was found to increase significantly several indicators of intoxication in normal men. However, treatment with L-dopa and aminophylline or ephedrine significantly reduced certain alcoholic effects, while specific dopaminergic simulation seemed to augment alcohol-induced effects on the central nervous system. Overall, the most promising potential amethystic agents now appear to be those with centrally acting properties. Methods primarily directed toward increasing the rate of alcohol elimination appear to have little promise at this time.

Alcohol and the Heart

Alcohol and its metabolic product, acetaldehyde, have specific effects on the heart muscle that can result in disease. Alcohol consumption coupled with poor nutrition can lead to other conditions, such as beriberi, that have their own associated cardiomyopathies. In these alcohol-related diseases, changes occur in the electrocardiogram, heart rhythm, heart muscle contractility, and blood pressure, as well as at the cellular and biochemical levels.

Alcoholic Cardiomyopathy

Alcoholic cardiomyopathy is believed to be caused by the toxic effects of alcohol or its metabolic products on the myocardium. Its symptoms are chronic shortness of breath and signs of congestive heart failure. It causes heart enlargement, abnormal heart signs, edema, enlargement of the spleen or liver, noisy breathing, electrocardiographic abnormalities, and disturbances of cardiac rhythm and conduction.

The disease, which does not occur suddenly, often exists in an incipient, subclinical form. Its severity is related to the duration of drinking by the patient, and the prospect of recovery is good in individuals who overuse alcohol for a short time and then give it up.

Coronary Heart Disease

Some reports indicate that heavy chronic drinking predisposes an individual to coronary artery disease. Additionally, there is evidence that alcohol can produce angina pectoris.

Interestingly, a number of reports have indicated that alcohol consumption up to limits of about 2.5 ounces of absolute alcohol per day is negatively related to coronary heart disease. In one study of nearly 8,000 men over a 6-year period, a statistically significant decrease was seen in the incidence of myocardial infarction and total coronary disease in the drinking groups compared to the abstinent controls. Daily consumption of these drinkers did not exceed the equivalent of three 12-ounce cans of beer. As consumption goes above these levels of absolute alcohol per day, the risk for developing coronary heart disease seems to increase.

Cardiac Arrhythmias

Irregularities in the heartbeat occur both in patients with alcohol-related diseases and in other individuals during alcohol intoxication. Ventricular fibrillation and palpitations caused by alcohol intoxication are common. In a study of 15 severely intoxicated men, 3 went into cardiac arrest, 11 showed disturbed heart rhythm, and 2 evidenced low blood pressure; these effects have been duplicated in numerous other studies.

Atrial fibrillation is seen most commonly in what is now called the "holiday heart syndrome," a cardiac arrhythmia seen in normally healthy individuals who appear in emergency rooms between Sunday and Tuesday after a weekend of heavy drinking, or near holidays associated with high alcohol consumption.

It is likely that alcohol-induced cardiac arrhythmia is due to both the direct effect of alcohol on the heart muscle and the effects of either alcohol or acetaldehyde on the heart's conduction system. Alcohol intoxication has been shown to affect the atrioventricular node so as to cause a complete heart block requiring pacemaker therapy.

Hemodynamic Effects of Alcohol

Some physiologic studies have indicated changes in cardiac hemodynamics (including blood pressure) which appear to depend on the type of measurement and the presence or absence of cardiac disease. An epidemiologic study of nearly 84,000 individuals, however, has demonstrated a highly significant increase in diastolic and systolic blood pressure in those who consumed three or more drinks per day.

Effect of Alcohol on Cardiac Contractility

Alcohol has been demonstrated to affect contractility of heart muscle in both in vivo and in vitro experiments. It can be shown in vivo that alcohol is a cardiac depressant, and several investigators have found that alcohol infusion causes a decline in several parameters of cardiac contractility. Some in vitro experiments in isolated heart muscles of dogs showed contractility changes, despite the fact that the animals demonstrated no hemodynamic alterations in vivo. This disparity seems to indicate that accurate measurement of the contractile state may be possible only in vitro.

Alcohol can have a very harmful effect on patients already suffering from heart disease. It has been shown, for example, that patients with cardiac disease experience a fall in cardiac and stroke index, indicating increased vulnerability, after drinking even one cocktail.

Effect of Alcohol on Heart Biochemistry

It is likely that damage to the heart muscle mitochondria is a major aspect of alcoholic cardiomyopathy and other alcohol-induced alterations of the heart. Electron microscopic studies show degenerative changes in these mitochondria and in other subcellular structures, including accumulation of lipids, lipochromes, and liposomes, as a result of chronic heavy alcohol consumption.

The association of alcohol consumption with the level of triglycerides, the fats transported in the blood by lipoproteins, is one of the most interesting aspects of recent research. Alcohol is moderately associated with depressions of low density lipoprotein (LDL) cholesterol and strongly associated with small elevations of high density lipoprotein (HDL) cholesterol. The effect of moderate intake of alcohol might be perceived as a means of shifting the lipoprotein balance in humans.

Interest in this balancing effect arises from investigations indicating that in persons over age 50, the level of HDL cholesterol in the blood correlates negatively with the heart attack rate. Also noted is the somewhat smaller negative correlation between such consumption and LDL cholesterol levels. Accompanying biochemical changes include severe depression of mitochondrial respiration, liberation of mitochondrial enzymes into the bloodstream, and reduction of myocardial ATP levels.

These effects on mitochondrial function are tied to alcohol metabolism in the liver, because the heart does not break down alcohol. Accordingly, the toxic effects on the heart are secondary to the effects on hepatic alcohol metabolism, which in turn affects the heart in two ways. First, the level and duration of cardiac exposure to ethanol are determined by the rate of ethanol metabolism in the liver. Second, the level of alcohol metabolism in the liver determines how much acetaldehyde enters the bloodstream to affect other organs.

Acetaldehyde increases heart rate, systemic arterial pressure, and myocardial contractile forces (as opposed to ethanol, which causes myocardial depression). It reduces microsomal cardiac protein synthesis significantly and inhibits the activity of tissue sulfhydryl groups.

Finally, the development of an excess of NADH over NAD^+ during hepatic ethanol metabolism can cause acidosis through the accumulation of excess lactic acid. Some investigators hold that this condition could interfere with the action of the contractile protein in heart muscle.

Alcohol and Noncardiac Muscle

Alcohol abuse is associated with alcoholic myopathy, a disease of the skeletal muscle with subclinical, acute, and chronic forms.

The subclinical form, estimated to occur in more than one-third of all alcoholics, produces elevated levels of the enzyme serum creatine phosphokinase with no clinical evidence of myopathy. However, asymptomatic alcoholics often have histories of muscle cramps, weakness, and occasional episodes of dark urine production. The disease in this form generally is reversible when alcohol abuse ends.

Acute alcoholic myopathy may be indicated only by the sudden onset of weakness. However, in severe cases, which can be fatal, there is either a sudden attack of pain in the skeletal muscles or a rapid progression of a previous chronic myopathy, accompanied by the appearance of myoglobin in the urine or blood serum. In patients whose symptoms include a dissolution of muscle tissue, renal failure and an excess of potassium in the blood often occur. The latter can result in effects on the heart that can be fatal. Acute alcoholic myopathy, too, may disappear if alcohol use is discontinued.

In the chronic form of the disease, onset of symptoms is insidious and marked by progressive muscle weakness and atrophy. Although some alcoholics with chronic alcoholic myopathy do not complain of symptoms, evidence of myopathy in the form of muscle tenderness or weakness or by some biochemical derangement is present. The chronic form may suddenly become acute, especially after a drinking spree. It, too, is usually subject to reversal following discontinuation of alcohol abuse.

In addition to these effects on skeletal muscle, alcohol has been found to affect smooth muscle as well. It inhibits uterine contractions, and certain intestinal muscle contractions in the guinea pig, as well as some contractions of the jejunum, and enhances certain waves of the ileum in humans.

Alcohol and the Endocrine System

For several reasons, relatively little systematic work has been done on the effects of alcohol on the endocrine systems. First, endocrine abnormalities are generally not life-threatening. Second, it is difficult to measure direct effects of alcohol on the endocrines because of the biomedical and psychosocial problems that can contribute to and obscure the effects. Third, it is difficult to select a study population of alcohol consumers because of variables within the group that render the data inconsistent. Finally, specific and direct techniques to measure hormone levels were lacking until recent years.

The review in this report is organized around three self-contained endocrine systems: the hypothalamic-pituitary-adrenal (HPA) axis, the hypothalamic-pituitary-gonadal (HPG) axis, and the hypothalamic-pituitary-thyroid (HPT) axis. In each, the hypothalamus emits a specific releasing factor that stimulates the pituitary to release a specific hormone into the bloodstream. The corticotropin-releasing factor stimulates the release of adrenocorticotropic hormone (ACTH), which stimulates the adrenals to produce cortisol. The luteinizing hormone-releasing factor stimulates the release of luteinizing hormone, which stimulates the gonads to produce sex hormones. The thyrotropin-releasing factor stimulates the release of thyrotropin, which stimulates the thyroid to release thyroxin.

Hypothalamic-Pituitary-Adrenal Axis

Acute alcohol administration acts on the HPA axis and causes increased secretion of the adrenal hormone cortisol. Cortisol, however, is not released in humans until high intoxicating levels of alcohol are reached, which may indicate that adrenal activation is simply a stress reaction to gross intoxication, rather than an alcohol-specific effect.

Research on the HPA axis and chronic alcohol exposure involves alcoholics who are still drinking, those undergoing acute withdrawal, and those who have been abstinent for long periods. The studies involving drinking alcoholics produce confusing results, as some show an increase in cortisol secretion and others do not. While these inconsistencies could be caused by many factors, they may reflect the development of tolerance to alcohol in the HPA axis of alcoholics. If this is true, the varied drinking histories and degrees of tolerance in individual alcoholics could markedly influence HPA response to a single dose of alcohol.

In alcoholics undergoing acute withdrawal, moderate to high elevations of serum cortisol were found, especially during delirium tremens. This biological stress response is, of course, understandable. An important question is wheth-

er the increase in serum cortisol comes before or after the alcohol withdrawal; some animal studies suggest that adrenal hyperactivity may actually play a primary role in the withdrawal syndrome instead of simply reflecting stress.

HPA axis function in long-abstinent alcoholics indicates normal adrenocortical activity in individuals, with no evidence of poor nutrition or impaired liver function. However, alcoholics who have been abstinent for relatively brief periods show adrenocortical insufficiency relative to controls. Since this effect is reversible, it does not indicate a primary defect in the HPA axis of alcoholics.

Hypothalamic-Pituitary-Gonadal Axis

Many male alcoholics manifest sexual impotence, loss of libido, and clinical symptoms of hypogonadism, including breast enlargement, loss of facial hair, and testicular atrophy. Several investigators have shown that serum levels of the male hormone testosterone are reduced greatly in human alcoholics and in rodents chronically treated with alcohol.

Three mechanisms by which this effect may occur have been supported by research. Several studies show that alcohol may interfere with the biosynthesis of testosterone in the testes. Others show that metabolism of testosterone in the liver via induction of steroid reductases increases in male alcoholics and in rodents chronically treated with alcohol. In some studies, estrogens have been found to be significantly elevated in male alcoholics with liver disease.

Several investigators have used nonalcoholics to study the effect of alcohol on gonadal function. Their conclusions indicate that the direction of change in serum testosterone after acute alcohol administration is determined by the dose of alcohol used and the time between administration and blood withdrawal for assay. One investigator reported that serum testosterone levels, unaffected during acute alcohol intoxication in volunteers, were significantly depressed 20 hours after injection, coinciding with the period of peak hangover for the subjects.

Evidence concerning the question of where alcohol exerts its primary effects on the HPG axis points to the conclusion that alcoholics have difficulties in both the peripheral (gonadal function and metabolism of androgens) and central (hypothalamus-pituitary) aspects of the axis. Further work based on these findings indicates that the fall in serum testosterone after acute alcohol administration is caused by alcohol-induced lowering of serum luteinizing hormone (LH) levels. Also, the doses required to depress serum LH and testosterone were found to be comparable, suggesting that there are no striking differences in the sensitivity of various levels of the HPG axis to alcohol.

Hypothalamic-Pituitary-Thyroid Axis

Neither acute nor chronic alcohol administration has a remarkable effect on the function of the HPT axis. In fact, despite the attention paid to thyroid function in alcoholics in the past, studies of the effects of alcohol on this system have not produced consistent results, and the magnitude of the effect has been rather slight. A number of investigators have found no abnormalities in thyroid function in carefully selected alcoholic populations.

Posterior Pituitary Hormones

The posterior pituitary hormones are demonstrably affected by alcohol. The release of oxytocin, a hormone that causes the uterus and smooth muscles in the mammary glands to contract, is inhibited by alcohol in a dose-dependent fashion. In fact, this property of alcohol has been used to inhibit uterine contractions during premature labor.

Pancreatic Hormones

The observation that alcohol produces hypoglycemia has focused attention on the direct effects of alcohol on the secretion of insulin by the pancreatic endocrine cells. Alcohol appears to augment insulin release, triggered by some of the normal releasers of the hormone. Still, this alcohol-induced elevation in serum insulin does not appear to contribute to alcoholic hypoglycemia, which can occur in the absence of alcohol-augmented insulin release. This fact alone strongly suggests that no causal relationship exists between the two.

Alcohol and Cancer

Alcohol is indisputably involved in the causation of cancer, and its consumption is one of the few types of exposure known to increase the risk of cancer at various sites in the human body.

In comparison to the general population, heavy consumers of alcohol always show a marked excess of mortality from cancers of the mouth and pharynx, larynx, esophagus, liver, and lung. In the United States, these cancers range from 6.1 to 27.9 percent of the total incidence of all cancer recorded in those locations where there are cancer registries.

Mouth, Tongue, Pharynx, and Larynx

In a retrospective study of 543 men and 116 women with cancers of the oral cavity, researchers found the consumption of alcohol, especially of whiskey, to be an important factor. In another study of the smoking and drinking experiences of 483 persons with cancer of the mouth and pharynx and 477 controls, relative risk was found to accelerate with increased exposure to each factor at every level of exposure to the other. The investigators felt that their findings suggested a combined effect at least equal to the sum of the strong individual factors. According to their calculations, 76 percent of the disease in males might be eliminated if exposure to both alcohol and tobacco were avoided.

The cases of 150 people with head and neck cancers were compared to those of 319 people with other cancers. Nonsmoking drinkers had a slightly higher risk of developing head and neck cancer, but the risk to nondrinking smokers was 2 to 4 times that of abstainers from alcohol and tobacco. The risk for heavy drinkers who smoked was 6 to 15 times greater than for nondrinking smokers, suggestive of the potentiating effect of the two agents acting in concert.

Alcohol consumption in combination with smoking also increases the risk for developing most cancers of the upper respiratory and digestive tracts. Of 108 patients with cancer of the tongue, 82 were excessive drinkers, 48 had cirrhosis, and 97 were heavy smokers. An additional study by the same researchers produced further data to support this theory of cocarcinogenesis. One theory advanced to explain this observation is that tobacco carcinogens might more easily gain access to the mucous membranes if the cells were bathed in alcohol.

The possibility also must be considered that the disease-producing mechanism may be the direct effect of alcohol or tobacco on the mucosa. It has been suggested that each might play a greater role in causing cancer of the areas it contacts directly.

Esophagus

The incidence of esophageal cancer varies enormously in different parts of the world. In most Western countries, the incidence is moderate, but high incidence rates have been reported in Asia, Africa, and the Caribbean.

The cancer-causing role of alcohol among smokers was found to be even greater in patients with esophageal rather than oral and laryngeal cancer. An increased risk existed for all drinkers, although it was apparently greatest for those who prefer whiskey.

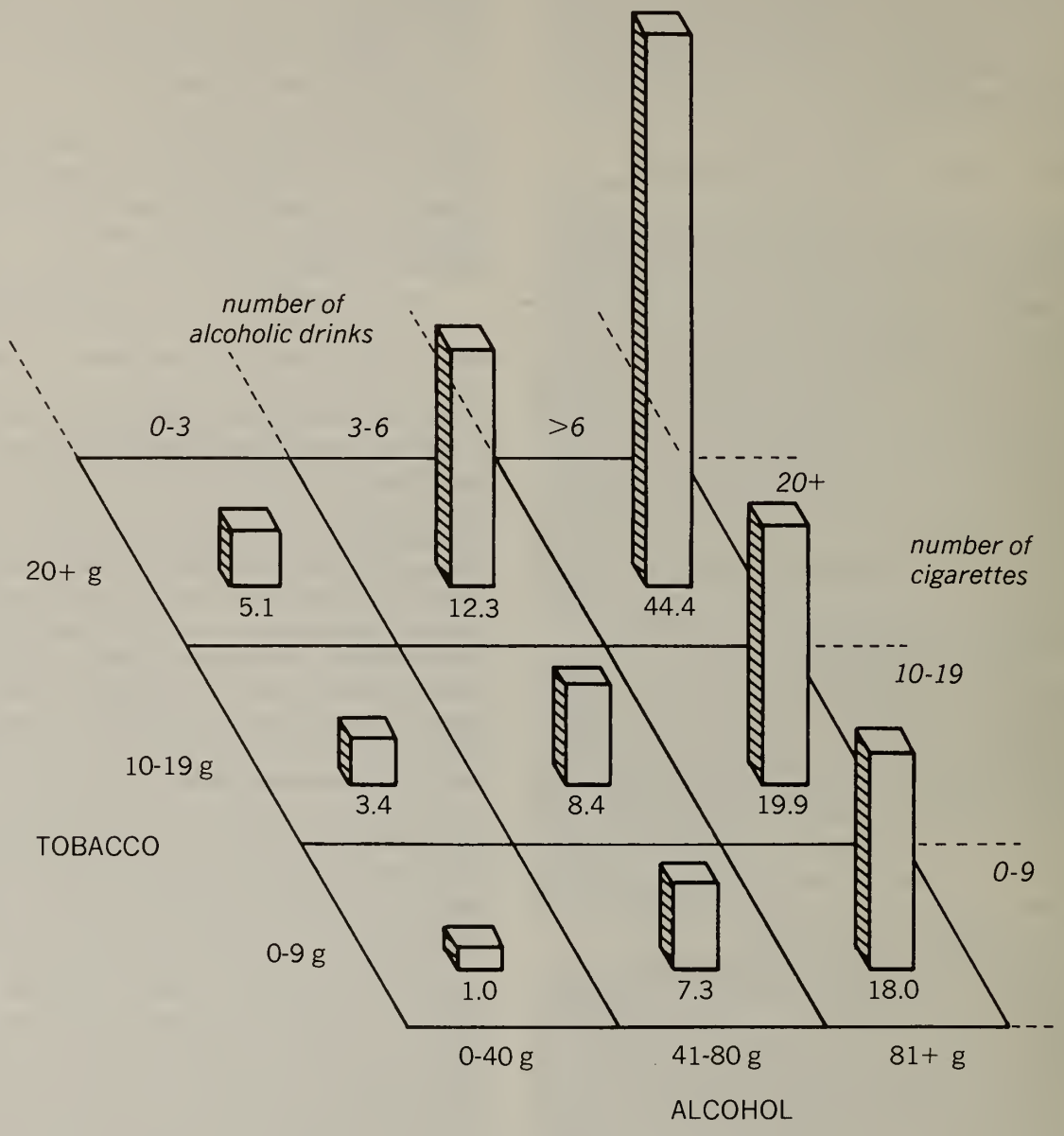
In a retrospective study of 400 patients with cancer of the esophagus, mouth, and pharynx and 1,200 controls, consumption of alcohol, tobacco, hot beverages, and spices were excessive among patients. Alcohol and tobacco were found to be the outstanding factors associated with these cancers, with alcohol the more important of the two.

Similar results were obtained in a study in western France. Data from that study were used to test the hypothesis that the cancer risks of alcohol consumption and smoking might be multiplicative. It was shown that the logarithm of the relative risk for esophageal cancer was related to the daily consumption of both substances, and their combination was consistent with a multiplicative model (figure 1).

The figure also indicates that the added risk associated with increasing alcohol from zero to three drinks (0-40 grams of alcohol) to three to six drinks is greater than the risk of increasing tobacco consumption from zero to nine cigarettes a day (0-9 grams of tobacco) to more than a pack a day. For individuals smoking less than half a pack of cigarettes a day, those who drink more than six alcoholic drinks increased their probability of developing cancer of the esophagus 18-fold over those ingesting less than three drinks per day. In contrast, for individuals consuming less than three drinks per day, the heavy smokers (more than a pack of cigarettes a day) increased their risk of esophageal cancer 5.1-fold over light smokers (less than 10 cigarettes a day).

In the United States, rates for esophageal cancer among nonwhites are increasing, while those of whites are decreasing. Similar trends in the incidence of other diseases have been attributed to smoking, drinking, and other unidentified factors in the urban environment to which blacks increasingly are exposed due to population shifts.

Figure 1. Relative Risks of Esophageal Cancer in Relation to the Daily Consumption of Alcohol and Tobacco



SOURCE: Data from A. J. Tuyns, G. Pequignot, and O. M. Jenson, Le cancer de l'oesophage en Ille et Vilaine en fonction des niveaux de consommation d'alcool et de tabac: Des risques qui se multiplient. *Bulletin du Cancer*, 65(1):45-60. 1977.

Note: The risk is 44.4 times greater for individuals consuming 20 g or more of tobacco and 80 g or more of alcohol per day (upper right block) than for individuals consuming little or none of either drug (lower left block). One ounce of ethyl alcohol is approximately 23.4 grams, thus 40 grams is 1.7 oz. or approximately equivalent to 3 drinks.

Stomach

The association between alcohol use and stomach cancer is not so clear as that between alcohol and esophageal cancer. Studies in England, the United States, and Czechoslovakia have failed to show the effect of alcohol among patients with gastric cancer. In France, several studies linked alcohol intake with stomach cancer, but the correlation was weaker than for cancer of the esophagus or larynx. In Japan, the risk of gastric cancer was not increased among daily drinkers in a retrospective study. However, in a study of 257 stomach cancer patients and 766 controls in Germany, high alcohol consumption was the second most important condition associated with the disease. The absence of an association between alcohol and stomach cancer in some parts of the world suggests that constituents in the alcoholic beverages (which vary between beverage and culture) may be more important than alcohol itself with respect to causation of stomach cancer.

Rectum

An association between rectal cancer and beer drinking has been suggested by several researchers studying the incidence of the disease in a number of countries. This association was not supported by a Danish study, but was upheld by a similar Irish one.

Liver

The highest incidence of liver cancer is found in Asia, Africa, and Latin America. The derivation of the disease in these places does not appear to be from alcohol, but rather from food contaminants and the prevalence of severe infectious hepatitis.

While the incidence of primary liver cancer is rare in North America and Europe, numerous autopsy studies have shown that it often is associated with cirrhosis, which nearly always is associated with high alcohol consumption. A series of studies on primary liver cancer revealed that from 64 to 90 percent of the victims of either condition had suffered from both.

In general, studies have shown an increase in the number of cases of cirrhosis associated with hepatocarcinoma, perhaps because the lives of cirrhotic patients can now be prolonged, increasing the probability of malignant degeneration of their damaged hepatic cells. One study reported that primary liver cancer occurred 2 to 7 years after the onset of cirrhosis, and another indicated an average lag of 8 years. A few authors also have noted that hepatoma may occur in alcoholics even in the absence of cirrhosis, which may indicate hepatic damage below the threshold of clinically or histologically identifiable alcoholic cirrhosis. It seems that alcohol acts similarly to other liver-damaging agents, and that the probability that a cancer will develop is increased once the damage occurs.

Cancer in Alcoholic Patients

Alcoholic patients with cancer have poorer chances of survival and greater chances of developing another primary tumor than do other patients with the same cancer. In a study of 211 cancer patients, survival was much shorter for heavy smokers and even shorter for heavy drinkers.

Additionally, the health of alcoholic cancer patients is damaged further by development of other tumors also related to excessive use of alcohol or tobacco. Continued smoking by patients with cancers of the mouth, pharynx, and larynx seemed to be more associated with the development of a second tumor than continued drinking, but abstinence from either after the first tumor did not insure that the patient would not develop a second tumor of the upper alimentary or respiratory tract.

Risks Associated With Alcohol and Other Constituents in Alcoholic Beverages

All alcoholic beverages contain chemicals in addition to ethanol. The carcinogenic property of an alcoholic beverage therefore may involve other constituents of the beverage, or alcohol and the other constituents may act synergistically in eliciting the cancer. In liver cancer, alcohol alone can function as the carcinogenic agent. Baboons fed purified alcohol have been shown to develop cirrhosis, and cirrhosis appears to be a sufficient condition for cancer development. In other cancers the role of the chemical ethanol is not as clear.

Carcinogenic agents have been found in many alcoholic beverages. Beer has been found to contain chrysotile (asbestos) fibers from the filters used in its manufacture, and samples of wine, beer, vermouth, and sherry (and river

water, too) were found to contain asbestos fibers, a well-known carcinogen. Wehman and Plantholt tested 28 control and unknown samples, including 9 samples of gin from four companies and 5 samples of water from the water supply of one company. The three samples of gin from one company had significantly more asbestos fibers than did the samples from any other source. In France, asbestos fibers were found in nine wine samples.

There have been only scarce data from animals to indicate that ethanol can produce cancer. When pure ethanol is given to rats or other species, no excess of tumors is ever seen. However, when experiments include other constituents of alcoholic beverages, as well as other carcinogens associated with alcohol consumption, such as tobacco, the observations are more like those in humans.

Some of the implicated contaminants found in alcoholic beverages include polycyclic hydrocarbons such as phenanthrene, pyrene, fluoranthene, benzanthracene, chrysene and benzo(a)pyrene (found in some distilled spirits), and fusel oils, a collective term for several higher alcohols produced during the fermentation process.

Medical Diagnostic Tests of Alcoholism

Researchers hope that the many acute, measurable biochemical and physiologic changes caused by alcohol ingestion eventually will form the basis for diagnostic tests for alcoholism. Unfortunately, most diagnostic tests now known are based on secondary effects, lack specificity, and depend on circumstantial evidence. The most specific tests measure changes that occur in only 15 to 20 percent of alcoholics, while the greatest need is for tests to diagnose the disease before it reaches its late stage.

Tests Reflecting Biochemical Effects of Alcohol

Acute Effects. Both acetaldehyde and acetate produced by alcohol oxidation disappear from plasma when oxidation is completed, so measuring them to diagnose alcohol intake is no better than the much simpler task of measuring blood alcohol content.

Alcohol's effect on plasma lipids depends on the individual's dietary and drinking history, basic lipid profile, and dose of alcohol ingested. Its effects on carbohydrate metabolism similarly depend on the individual's nutritional state and the body's ability to coordinate secretion of the hormones epinephrine, insulin, and glucagon. When liver glycogen stores are depleted, alcohol may interfere with gluconeogenesis, resulting in profound hypoglycemia. Clinicians, therefore, always consider alcohol a possible factor in hypoglycemia.

Some researchers are exploring the use of serum gamma-glutamyl transpeptidase (GGT) for diagnosis of alcoholism, which several authors have claimed is elevated in serum in alcoholics with no other abnormality of liver function. Elevated GGT in the absence of these other abnormalities of hepatic function may alert the clinician to the possibilities of alcoholism, other drug use, or early nonalcoholic liver disease.

Finally, heavy alcohol intake has been associated with altered collagen metabolism in several studies, suggesting that serum and urine proline and hydroxyproline excretion may aid in the diagnosis and prognosis of alcoholic liver disease.

Chronic Effects. Clinical biochemistry is important in the diagnosis of alcoholic liver disease and malnutrition, both of which often confirm the diagnosis of prolonged heavy drinking. Magnesium, zinc, and calcium excretion are increased by alcohol, and plasma zinc concentration is decreased. Tissue iron retention is common in alcoholism. Unfortunately, none of these effects on mineral metabolism is specific to alcoholism, but may suggest its presence.

Recently the ratio of plasma alpha-aminobutyric acid to leucine has been proposed as an empirical marker of alcoholism; this ratio may become the basis for a diagnostic test for alcoholism if further verified. Another possible future test involves the seemingly abnormal tryptophan metabolism in alcoholics.

Serum or urine levels of vitamins may be affected by heavy drinking, too; but because these levels are also affected by liver disease and malnutrition, measuring them to diagnose alcoholism is not very useful.

Tests Reflecting Morphologic Effects of Alcohol

Alcoholism causes fibrotic swelling of the parotid glands, a physical sign of probable

alcoholism. Similar effects of alcohol on lung morphology are unknown, but repeated infections and bronchitis associated with alcoholism and smoking often result in chronic obstructive lung disease and emphysema.

Summary

- Alcohol has a pervasive effect on the body from its point of entry through the gastrointestinal tract, the liver, and throughout the bloodstream. The brain and nervous system, heart, muscles, and endocrine system are also affected.

- Alcohol is associated with cardiomyopathy, a disease of the heart muscle. Diseases of the coronary arteries, such as angina pectoris and myocardial infarction, increase with heavy alcohol consumption. However, some epidemiologic data suggest that the risk for coronary artery disease may be smaller in light drinkers than in abstainers.

- Atrial fibrillation is seen most commonly in what is emerging as the "holiday heart syndrome," a cardiac arrhythmia noted in individuals free of overt heart disease, who appear in emergency rooms after drinking weekends or near holidays associated with high alcohol consumption.

- Researchers are attempting to develop amethystic (sobering) agents that could abort or mitigate alcohol's depression of central nervous system functions by counteracting the acute effects of alcohol intoxication. Amethystic agents would be important in treating medical emergencies caused by an overdose of alcohol.

- Indisputably, alcohol is one cause of cancer. Drinking alcoholic beverages exposes the drinker to an increase in the risk of cancer at various sites in the body.

  - Heavy drinking increases the risk of developing cancer of the tongue, mouth, oropharynx, hypopharynx, esophagus, larynx, and liver. In the United States, these sites represent 6.1 to 9.1 percent of all cancers in the white population and 11.3 to 12.5 percent among blacks.

  - Alcohol has a synergistic effect with tobacco that increases the risk of cancer. For example, one study showed that the risk of head and neck cancers for heavy drinkers who smoked was 6 to 15 times greater than for those who abstain from both. Another study showed a risk of esophageal cancer 44 times greater for heavier users of both alcohol and tobacco, as compared to 18 times greater for heavier users of alcohol only and 5 times greater for heavier users of tobacco only.

  - Although rare in North America and Europe, primary liver cancer often is associated with cirrhosis, which nearly always is associated with alcohol consumption. A series of studies revealed that from 64 to 90 percent of the victims of either condition had suffered from both.

- As understanding of the metabolic, physiologic, and morphologic effects of alcohol increases, specific tests to determine alcohol abuse may be developed based on the altered functioning of various systems throughout the body.

Chapter IV.

The Fetal Alcohol Syndrome and Other Effects on Offspring

In February 1977 NIAAA sponsored a workshop to assess the state of knowledge gained from research on the intrauterine effects of alcohol. Reports were presented from human epidemiologic investigations, animal studies, behavioral assessments in animals and infants, and mechanistic studies exploring the biochemical consequences of maternal alcohol ingestion on metabolic function of fetal tissue. The evidence gathered from these studies clearly indicates that alcohol is a substance that can cause birth defects and behavioral impairment in offspring of mothers who consume it while pregnant. In particular, a unique pattern of dysmorphology with mental impairment occurs in some offspring of women who consume alcohol heavily; this condition has been termed the fetal alcohol syndrome (FAS) (see table 1).

When moderate levels of alcohol are involved, it is not easy to implicate alcohol as a unique factor in the development of birth defects and mental impairment. Furthermore, with human subjects, it is difficult to separate alcohol's effects from those of substances such as caffeine and nicotine. As a result, animal studies have become increasingly important as a means of studying the dangers of alcohol use during pregnancy and evaluating threshold limits.

Based upon the evidence presented and discussed at the workshop, the participants recommended that NIAAA issue a cautionary statement on alcohol use during pregnancy. On June 1, 1977, the following statement was released:

> Recent research reports indicate that heavy use of alcohol by women during pregnancy may result in a pattern of abnormalities in the offspring, termed the Fetal Alcohol Syndrome, which consists of specific congenital and behavioral abnormalities. Studies undertaken in animals corroborate the initial observations in humans and indicate as well an increased incidence of stillbirths, resorptions, and spontaneous abortions. Both the risk and the extent of abnormalities appear to be dose-related, increasing with higher alcohol intake during the pregnancy period. In human studies, alcohol is an unequivocal factor when the full pattern of the Fetal Alcohol Syndrome is present. In cases where all of the characteristics are not present, the correlation between alcohol and the adverse effects is complicated by such factors as nutrition, smoking, caffeine, and other drug consumption.
>
> Given the total evidence available at this time, pregnant women should be particularly conscious of the extent of their drinking. While safe levels of drinking are unknown, it appears that a risk is established with ingestion above 3 ounces of absolute alcohol or six drinks per day. Between 1 ounce and 3 ounces, there is still uncertainty but caution is advised. Therefore, pregnant women and those likely to become pregnant should discuss their drinking habits and the potential dangers with their physicians.

A version of this statement appeared in the June 3, 1977 (vol. 26, no. 22) *Morbidity and Mortality Weekly Report*, circulated by the Center for Disease Control to approximately 200,000 health professionals. A similar alert was placed in the September/October 1977 issue of the Food and Drug Administration's *Drug Bulletin*, that more than 700,000 health professionals receive.

On November 15, 1977, the FDA Commissioner asked the Director of the Bureau of Alcohol, Tobacco, and Firearms to place a

Table 1. Most Consistent Features of the Fetal Alcohol Syndrome

Growth and Performance

- Prenatal onset growth deficiency, more pronounced in length than in weight
- Concomitant microcephaly (small head circumference) even when corrected for small body weight and length
- Postnatal growth deficiency in weight and length, usually below 3rd percentile
- Delay of intellectual development and/or mental deficiency (mean IQ from Seattle study = 64, range 16-92)
- Fine motor dysfunction (poor coordination)

Head and Face

- Microcephaly
- Short palpebral fissures (narrow eye slits)
- Midfacial (maxillary) hypoplasia (underdevelopment of midfacial region)
- Flattened, elongated philtrum (middle of upper lip) associated with thin, narrow vermilion lip borders (highly specific to FAS)
- Minor ear anomalies including low set ears

Limbs

- Abnormal creases in the palm of the hand
- Minor joint anomalies
  - —syndactyly (fingers or toes joined together)
  - —clinodactyly (abnormal bending of fingers or toes)
  - —camptodactyly (one or more fingers constantly flexed at one or more phalangeal joints)

Heart

- Ventricular and atrial septal defect (valve defects)

Brain

- Absence of corpus callosum
- Hydrocephalus (excess fluid in cranium)
- Brain cell migratory abnormalities

Other

- Minor genital anomalies
- Hemangiomas (benign tumors made up of blood vessels) in infancy

SOURCE: Data from Kenneth L. Jones and David W. Smith, The fetal alcohol syndrome. *Teratology*, 12(1):1-10. 1975.

warning label on alcoholic beverages. Further support for such action came in the form of testimony by the Administrator of ADAMHA and the Commissioner of FDA at the January 31, 1978, hearing of the Senate Subcommittee on Alcoholism and Drug Abuse on the issue of alcoholic beverage labeling related to the fetal alcohol syndrome.

Description of the Fetal Alcohol Syndrome

The fetal alcohol syndrome first was recognized in this country by dysmorphologists at the University of Washington in 1973. Their work was prompted by a retrospective review of clinic records from the university hospital to identify the children of alcoholic women. Of 11 alcoholic women, 10 of their 12 children were small for gestation age. Five had retarded development, and three were borderline retarded. Eight of the infants failed to grow, and their weights and head circumferences remained below the third percentile, although six of them received adequate diets at home. The two infants who were poorly fed at home continued to fail to grow normally even when hospitalized. Further retrospective analysis revealed that 11 of the 12 children born to the alcoholic women exhibited this distinct pattern of abnormalities.

A subsequent study on the intellectual development and motor performance of 12 offspring of alcoholic women revealed that all except one of the children were in the borderline or retarded range of intelligence. In general, children with the clear features of FAS were the most retarded, while those who were mildly affected physically appeared less impaired mentally.

After these American findings were published, the research community became aware of a 1968 European study in which 127 offspring from 69 French families characterized by alcoholism were studied. The close similarity between the symptoms described independently by the two research groups studying these different populations was noteworthy.

Further Case Reports

The initial publications from Seattle identifying and describing the FAS stimulated many case reports from around the world. Some variability in the pattern of defects seen may be related to different patterns of chronic alcohol use at different stages of pregnancy, as well as to factors such as the maximum blood alcohol concentration, binge drinking versus relatively steady alcohol levels, type of beverage, and general nutritional status. The importance of genetic predisposition to susceptibility may be indicated by several reports of fraternal twins with different abnormalities.

Prospective Studies

While the retrospective analyses have supplied strong evidence that the FAS is a true clinical manifestation, prospective studies and investigations with animal models also are vitally needed as part of the assessment process. They are important in establishing the risk for the alcoholic woman and evaluating the contribution to this risk of such factors as type of beverage and pattern of drinking. If the full FAS is seen in a percentage of the offspring of alcoholic women, it is reasonable to suspect that some adverse outcome less severe than the full syndrome may arise in children of women who drink heavily, as well as in those of some women who drink moderately. Clearly, too, analysis of the contribution of such substances as nicotine, caffeine, and prescription and illicit drugs is complicated by the fact that such consumption frequently increases with escalating alcohol consumption. Lifestyle is another important variable; stress, for example, is likely to be high among heavy drinkers.

Nutrition deserves special comment. While the type and adequacy of nutrition vary with socioeconomic and ethnic background, none of the prospective studies uncovered differences in nutritional intake among heavy drinkers versus moderate and light drinkers and abstainers when the controls were matched for socioeconomic level and background.

Two prospective studies have been reported from Europe, one in France and the other in Germany. The French study reported on the relationship between alcohol consumption among pregnant women and outcome from a prospective study of 9,236 pregnancies at 13 French maternity centers between 1963 and 1969. While there were significantly more stillbirths among the heavier drinkers, no significant variation in frequency of congenital malformation was observed. Infants born to the heavier

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drinkers had lower birth weights, and the placentas were smaller.

Three ongoing American studies, all supported by NIAAA, are being conducted at Boston City Hospital; the University of Washington, Seattle; and in the environs of Loma Linda, Calif. Currently, they have produced useful preliminary data.

The Boston study, initiated in May 1974, involved 633 volunteers, of whom 58 (9 percent) were heavy drinkers; 249 (39 percent) moderate drinkers; and 326 (52 percent), rare drinkers. Heavy -drinking women had social characteristics comparable to the total sample population with a few significant differences: They were significantly older, 25.7 years versus 22.8 years ($p<.001$); and 60 percent of them smoked a pack of cigarettes or more a day, in contrast to 15 percent of the rare drinkers ($p<.001$).

Detailed pediatric, neurologic, and developmental examinations were administered in the newborn nursery to 322 infants. In comparison with the babies of moderate and rare drinkers, offspring of the heavy-drinking women showed significantly more growth retardation in length, weight, and head circumference, and more congenital malformations.

The University of Washington prospective study, initiated in October 1974, included 1,529 pregnant women from primarily middle class backgrounds. Eighty percent of the women drank in the month prior to pregnancy (mean alcohol consumption, .34 ounces of absolute alcohol per day); 81 percent drank during the first 5 months of pregnancy (mean alcohol consumption, .16 ounces of absolute alcohol per day). Daily mean nicotine consumption was 14.0 mg for the 25 percent of the sample who still smoked at the fifth month.

Various subsamples of the group were evaluated as part of the component studies. One effort focused on the features of growth and morphogenesis. Offspring of women who consumed 1.0 ounce or more of absolute alcohol per day (heavier drinkers) in the month prior to and/or during the first 5 months of pregnancy were compared to control infants born the same day and place to light drinking and abstaining mothers. Among the 163 infants examined, 82 were born to heavier drinkers; of the 11 infants with some clinical features of altered growth and morphogenesis, 9 were born to those who drank more ($p<.05$). The mothers of the two infants with easily recognizable FAS each consumed more than 5 ounces of absolute alcohol daily during the month prior to the recognition of pregnancy.

In a second subsample, 200 newborns from the heavier-drinking women (1.0 ounces or more per day) and 200 infants randomly selected from the nondrinkers and infrequent drinkers were examined. Highly significant effects of alcohol were found on two scores, indicating that drinking at social levels during pregnancy is related to poor habituation and muscle tone and to decreased activity in day-old infants.

A third subsample of 135 babies revealed that infants exposed to relatively high amounts of alcohol seemed to be less alert, to sleep less quietly and with decreased rapid eye movement, to fuss and cry more, and to exhibit more facial and body tremors.

The third and largest American epidemiologic study is being conducted by Loma Linda University Medical Center at four southern California hospitals. Data will be derived from women of diverse socioeconomic and cultural backgrounds.

Animal Models of the Fetal Alcohol Syndrome

The inherent difficulty in separating the multiple variables involved in clinical studies of the effects of alcohol on human infants required that animal models be developed. One of these studies examined the effects of ethanol by simulating the blood ethanol levels (similar to levels found in human alcoholics) in the early stages of development in chick embryos. Early maldevelopment and mortality occurred in a considerable percentage of the embryos, and the other embryos showed significant weight loss toward the end of incubation. The central nervous system was the most affected organ.

In another study, albino rats given alcohol at a dose of 2 g/kg produced fetuses with twice the number of malformations as animals given 1.5 g/kg. Furthermore, two heavy doses were more injurious than three lighter ones. Effects on the bones seemed to be most apparent in the extremities and facial areas, the same regions affected in humans showing signs of the FAS.

Other researchers fed female rats water containing ethanol at 30 g/100 ml as their only available fluid. After 1 month, their blood alcohol concentration (BAC) was .061 percent —.023

percent. Only 50 percent of the alcohol-treated mothers known to have copulated delivered litters, and the average size of their litters was significantly lower than the mean litter size of control mothers. In addition to small size, offspring of the alcohol-fed mothers exhibited abnormally small heads; cracked, dry, loose skin; reddened areas on the head and body; and a generally shriveled appearance.

Another researcher administered alcohol in an all-liquid diet to two highly inbred strains of mice (CBA and C3H) that differed in ethanol preference, alcohol dehydrogenase (ADH) activity, and ethanol sleep times. Blood alcohol levels of .073 to .398 percent were achieved in these animals by feeding them 15 percent and 35 percent, respectively, of their calories in ethanol.

The mice were sacrificed on day 18 and the uterine contents examined. Fetal resorptions had increased with increasing ethanol concentrations, and the dose response curve suggests that the strain with lower ADH activity was more sensitive to ethanol than the strain with the greater metabolic capacity. There was a definite growth deficiency due to ethanol, which was fatal beyond a point. When fetuses were sectioned, the pattern of growth deficiency and ocular, neural, cardiac, and skeletal anomalies observed was similar to that of the fetal alcohol syndrome in humans.

Finally, investigators have reported efforts to develop an experimental model of the FAS in the beagle. A high dose group received 5.8 g/kg of ethanol; the moderate dose group, 4.5 g/kg; and the low dose group, 3.0 g/kg. The high dose of ethanol induced severe physical dependence and completely suppressed intrauterine tissue differentiation and development of the fertilized and implanted ovum. The moderate dose produced dependence of a milder degree and permitted a more advanced intrauterine development with spontaneous abortion at 6 to 7 weeks' gestation or retention within the uterus of abnormal, dead fetuses. A low dose produced no detectable dependence, and was followed by the birth of normal pups at term. These findings suggest that a threshold dose of ethanol may be found that will produce malformations in fetuses that are able to maintain viability.

It is important to point out that comparisons between man and other species are best made on the basis of BAC. Comparisons on the basis of dose alone are plagued by problems related to high alcohol metabolism in some species as well as factors such as fat to tissue and bone ratio. The evidence from animal studies clearly suggests a risk to mothers who consume six drinks or 3 ounces or more of absolute alcohol per day. This threshold was calculated by taking the minimal BAC at which clear abnormalities are manifested in the animal studies and then calculating the level of drinking that would be required to achieve this BAC in a 130-pound woman and maintain it for 6 to 8 hours. Further animal experimentation and human prospective studies will be required to determine the possible consequences of lower dosages of alcohol.

Alcohol and Minimal Brain Dysfunction

Some recent evidence from human epidemiologic and animal studies indicates that maternal alcohol use may be central to the pathogenesis of the subtle yet frequently encountered abnormalities of attention, behavior, and learning that comprise the minimal brain dysfunction (MBD) symptom complex. MBD is one of the most pressing problems in contemporary medical practice because it affects an estimated 5 to 10 percent of the school-age population, or 5 to 7 million children in the United States. Furthermore, it is suspected that many MBD victims later exhibit deviant, antisocial, and delinquent behavior.

Investigators have reported on children affected by maternal alcohol consumption who did not fit the pattern of the full syndrome. The nine boys and two girls referred to a hospital learning disorders unit from a cohort of 85 MBD children were born to heavy-drinking mothers. These children exhibited many of the features of the FAS: prenatal growth deficiency; postnatal growth deficits affecting height more than weight; abnormally small heads; facial stigmata; and mild limb abnormalities. Each had normal developmental milestones and average intelligence. Areas of poorest performance on psychometric testing (coding, arithmetic, digit span, and information) reflected deficiencies in attention, concentration, memory, and learning. In addition, each was hyperactive, impulsive, and fidgety from early school years to adolescence.

These data suggest that the pattern of hyperactivity, attention deficits, and school learning difficulties despite average intelligence associated with subtle morphologic anomalies

may represent a symptom complex that is directly associated with maternal alcoholism. It is certainly apparent that the effects of alcohol on the fetus are likely to include more than the relatively rare pattern of abnormalities that is currently described as the fetal alcohol syndrome.

Effects on the Developing Central Nervous System and Sleep Patterns

In a neuropathologic study of seven human brains from offspring exposed in utero to high concentrations of alcohol, widespread malformations resulting from neuronal and glial migratory failure were observed in five. Significantly, brain lesions may occur in individuals who do not show other features of the FAS. The most critical period appears to be within the first 85 days of gestation. High blood alcohol concentrations during this period, resulting from intermittent binges or daily heavy drinking, may produce similar malformations.

Researchers have investigated the effects of chronic ethanol ingestion on brain ribonucleic acid (RNA) metabolism in mature mice. There were significant changes in RNA metabolism due to an alteration in the transcription and/or the processing of RNA in the nucleus. Other investigators, examining the effects of maternal alcohol ingestion on the fetal brain, heart, liver, and kidney in rats found that a morning BAC of 0.067 percent depressed the total RNA levels significantly by about 10 to 30 percent ($p<.05$) in the four organs studied.

Researchers investigated the extent to which a newborn's sleep is affected by exposure to high blood alcohol concentrations during fetal life. Infants born to heavy drinking women who continued to drink throughout the pregnancy were compared with infants born to heavy drinking women who were able to abstain or reduce alcohol consumption significantly for the third trimester. Infants born to the women who continued to drink heavily showed grossly abnormal patterning of sleep compared with those in a control group. Offspring of women who reduced alcohol consumption showed less severe abnormalities.

Implications for Prevention

The establishment of the FAS as a recognized consequence of excessive alcohol use during pregnancy gives impetus to the need for prevention efforts. It is now thought that heavy alcohol ingestion during the initial gestation period, before the mother realizes she is pregnant, may be sufficient to produce a statistically significant occurrence of either the full FAS or partial manifestations of it.

The implications are clear. Women of childbearing potential must be alerted to the dangers of misuse of alcohol before the onset of pregnancy. Conservative figures suggest an incidence of the FAS of greater than 1 in 5,000 pregnancies, perhaps closer to 1 in 2,000 or one fully developed case for every 100 women consuming more than 1 ounce of alcohol daily during early pregnancy. On this basis, the FAS would be the third leading cause of birth defects with associated mental retardation, following only Down's Syndrome (1 in 600) and spina bifida (1 in 1,000). Most important, of the three, only the FAS is preventable.

Summary

- Research on the impact of maternal alcohol consumption on human infants has demonstrated that the fetal alcohol syndrome (FAS) is a clinically observable abnormality.

- Prospective studies are underway to determine the incidence of the FAS, the range of symptoms, the relationship between anomalies and amount of alcohol consumed, and other maternal risk factors. Three major epidemiologic studies on maternal alcohol consumption and infant outcome funded by NIAAA are in progress in the United States.

- A high blood alcohol level during a critical time of embryonic development probably is necessary to produce the FAS. The average alcohol consumption may not be as important as the maximum concentrations obtained during binge drinking at critical periods.

- Undoubtedly, there are many more cases in which only part of the syndrome is found. These may be instances of single malformations, retarded growth and development, or behavioral patterns such as jitteriness, with-

out the full syndrome. Such individuals may constitute a component of the large population diagnosed as exhibiting minimal brain dysfunction.

- The evidence from animal studies is quite compelling and clearly suggests a risk for human infants when daily alcohol consumption is 3 ounces (six drinks) or more of alcohol. Further animal experimentation and human prospective studies will be required to determine the risk from lower doses of alcohol.

- Observations of alcohol's effects on physiology and metabolism, particularly as related to the central nervous system, support the view that placental alcohol exposure may impair morphologic and neurologic fetal development.

- Brain lesions may occur in individuals who do not show other features of the FAS. Common neuropathologic findings are widespread malformations resulting from failure of the brain cells to migrate to their proper location.

- The projected incidence of the fetal alcohol syndrome makes it the third leading cause of birth defects with associated mental retardation—following only Down's Syndrome and spina bifida—and the only one of the three that is preventable.

Chapter V.

Interaction of Alcohol and Other Drugs

The wide spectrum of alcohol's effects on the body and on behavior is well documented in other chapters of this report. The problems that arise when alcohol is used in combination with other pharmacologic agents are an additional concern. Particularly within the last three decades, there has been a considerable increase in the use of pharmaceuticals, including self-prescribed, over-the-counter, and illicit drugs, as well as those that are physician prescribed. Alcohol consumption has increased at the same time, resulting in greatly expanded opportunities for the problems associated with alcohol-drug combinations.

Many alcohol-drug combinations can result in severe health consequences, including death. Adverse effects are not necessarily deliberate, although they may be in many cases of suicide or when people experiment with such combinations for their mood-altering effects. In fact, most instances of adverse reactions are accidental. Although the effects of alcohol alone may be well known, that alcohol can interact detrimentally with other commonly used drugs is often overlooked. Even one or two drinks can have serious consequences for individuals taking various prescription drugs, or even aspirin. It is especially important that prescribing physicians are informed of the possibility of these interactions so that they may advise their patients when alcohol should be avoided.

The issue of drug interactions with alcohol is important, too, in treating alcoholics and others who drink heavily. Heavy alcohol use results in a wide variety of physiologic and functional changes in the individual that may result in altered sensitivity to other drugs. For example, aspirin can produce massive gastric hemorrhage in the alcoholic, who typically has low prothrombin levels and alcoholic gastritis. Similar problems may be encountered when antidiabetic or anticoagulant agents are prescribed for alcoholics.

In addition, adverse consequences of alcohol-drug misuse are not strictly medical. Alcohol is perhaps best known as a central nervous system (CNS) depressant, and as such, it impairs the performance of tasks requiring vigilance, speed of reaction, and coordination. When alcohol is combined with other sedatives or depressants—antihistamines, for example—this impairment can be exaggerated, and tasks such as driving vehicles or operating machinery can be especially dangerous.

Combining alcohol with "drugs of abuse" is a special problem. These drugs are ingested specifically for their effects on the nervous system, and there is considerable potential for interaction with similar effects of alcohol. Reports collected from hospital emergency rooms and inpatient units, medical examiners, and crisis centers in 29 U.S. metropolitan areas show that alcohol in combination with other drugs is a substantial problem. Of the approximately 200,000 drug crises reported annually in these areas, the second most frequent cause was alcohol in combination with other drugs of abuse. Medical examiners reported that 13 percent of all drug-related fatalities involved alcohol in combination with other drugs, again the second most frequent cause in the category.

Data from a recent nationwide survey indicate that drinkers are several times more likely than people who do not drink to use psychoactive substances nonmedically (table 1). A sizable proportion of persons using hallucinogens, cocaine, opiates, inhalants, and marihuana combine alcohol with these drugs. Among adults who ever have used marihuana, more than one-fourth report combining it with alcohol, as do roughly one-fifth of all cocaine users. The prevalence of combined use, however, is greater among regular or more frequent users of drugs or alcohol. In one study of more than 10,000 persons arrested for drunken driving, a significant proportion of the

Table 1. Use of Other Drugs Among Current Drinkers and Those Who Are Not Current Drinkers*

Use of Other Drugs	Percentage of Youth: Ages 12 to 17 Years		Percentage of Adults: Ages 18+ Years	
	Current Drinkers	Not Current Drinkers	Current Drinkers	Not Current Drinkers
Size of sample (unweighted base)	302	684	1622	968
Nonmedical psychotherapeutic pill user				
Yes	18.8	6.5	18.9	9.4
No	81.2	93.5	81.1	90.6
Ever used marihuana				
Yes	44.3	11.8	31.4	6.9
No	55.7	88.2	68.6	93.1
Ever used other illicit drugs				
Yes	36.7	10.2	19.7	4.7
No	63.3	89.8	80.2	94.6

SOURCE. H. I. Abelson and P. M. Fishburne, *Nonmedical Use of Psychoactive Substances*. Princeton, NJ: Response Analysis Co., 1976

*Those who report drinking alcoholic beverages within the past month

drivers had been taking other drugs in addition to alcohol.

An "interaction" between alcohol and a drug is any alteration in the pharmacologic properties of either due to the presence of the other. Interactions may be (1) antagonistic, so that the effect of either or both agents is blocked or reduced; (2) additive, so that the net effect of the combination is the sum of the effects of the individual agents; or (3) supra-additive (synergistic or potentiating), so that the effect of the two agents in combination is greater than it would be if they were merely additive. This third situation is probably the most important from a public health viewpoint, since the hazards of these combinations are greater than expected.

A fourth type of interaction can occur in alcoholics or heavy drinkers whose alcohol-related pathologies may make them especially sensitive to other drugs. Furthermore, chronic alcohol use also can produce tolerance, that is, a fixed amount of alcohol has less of an effect than it would in the nonchronic user. In cross-tolerance, a fixed amount of another drug also has less of an effect in the alcohol user than in the nonuser.

The mechanisms underlying many drug interactions and the development of cross-tolerance are as obscure as those underlying the effects of the individual agents, a situation that is particularly true of direct interactions at the primary site of action. Other, more indirect actions, such as the effects of one agent on the absorption, distribution, metabolism, and excretion by the body of another agent, may be more readily understood.

The possible negative consequences of combined use of alcohol and several major types of drugs are discussed in this chapter. Unfortunately, in some categories only one or two drugs have been examined, and many of the studies have employed behavioral measures that are not highly sensitive.

Barbiturates

The well-known danger to human life from combined use of alcohol and barbiturates appears to result from a supra-additive interaction. In one study of human fatalities, the lethal dose of barbiturates was nearly 50 percent lower in the presence of alcohol than when used alone. Other studies confirm that the combined presence of alcohol and barbiturates, even in low doses, increases the potential for fatal, intentional, and accidental overdoses. Barbiturates and alcohol combined can cause significant respiratory suppression.

Alcohol and barbiturates also interact with regard to their behavioral effects. One study examined the interaction of alcohol and the long-

acting phenobarbital; it found complex reaction times increased sufficiently to describe the effects as supra-additive. Alcohol also has been shown to affect people who had taken medium- and short-acting barbiturates several hours before; they tended to fall asleep and to exhibit impaired motor performance. Simulated driving tests showed that combined alcohol and secobarbital resulted in considerably greater performance impairment than either drug alone would cause.

Extensive animal studies support these findings. The combined effects on sleep, mortality rates, respiratory failure, and avoidance behavior were noted in many species, and the effects of the two drugs always were greater than those of either drug alone. A major source of this potentiation is the inhibition by alcohol of the enzymes that metabolize other drugs, so that the drugs are present in the bloodstream in higher than normal amounts. Synergism and tolerance may occur directly in brain tissue as well. These data indicate that barbiturates should not be used in the treatment of alcoholism.

The Minor Tranquilizers

This class of psychotropic drugs is most likely to be combined with alcohol by the general population. People usually are unaware that tranquilizers are CNS depressants which can increase the detrimental effects of alcohol on performance, skills, and alertness.

Meprobamate (Equanil®, Miltown®)

In combination with alcohol, meprobamate has been examined extensively for possible effects on driving-related skills. Decreased oculomotor control, body steadiness, and ability to perform on arithmetic and verbal mental tests, and increased drowsiness and fatigue have been observed after combined alcohol-meprobamate use. The increased impairments occurred in time estimation, attention, reaction time, and alertness. Results of these studies on humans are corroborated by findings in animal research.

Benzodiazepines

The most frequently used minor tranquilizers are the benzodiazepines, such as diazepam (Valium®) and chlordiazepoxide (Librium®). There is strong evidence that diazepam alone or in combination with alcohol is the cause of a great many driving accidents. Some studies have shown that the combination impairs reaction times and coordination ability more than when either drug is used separately. There is, however, little direct evidence of increased behavioral deterioration when alcohol and other benzodiazepines are combined. It seems that subjects are unaware of the increased impairment and incapable of judging it. Accordingly, those who use alcohol and diazepam should be informed of the possible debilitating effects resulting from combined use, particularly regarding the driving hazards.

Care should be taken when using or prescribing all drugs in this category, since there have been reports that some benzodiazepines, when combined with alcohol, have produced a severe hypotensive effect, leading to depressed cardiac functioning and respiratory arrest.

The Major Tranquilizers

Typically, these potent tranquilizers are used for seriously emotionally disturbed patients. The most commonly used are the phenothiazines such as chlorpromazine (Thorazine®) and thioridazine (Mellaril®), and the alkaloids of rauwolfia including reserpine (Serpasil®). The major tranquilizers are CNS depressants and in combination with alcohol can produce severe, possibly fatal, depression of the respiratory center. Excessive drinking by a person who is also taking these drugs can lead to impaired hepatic functioning and resultant toxic manifestations by a mechanism similar to that of barbiturates. Researchers caution against using the phenothiazines to control alcohol withdrawal since these drugs lower the seizure threshold and can induce hypotension, which can be exacerbated by alcohol.

When the interaction of alcohol with chlorpromazine was examined in relation to motor skills, the combination lengthened reaction time. Animal studies indicate that chlorpromazine increased the effects of alcohol on respiration, motor activity, sleeping time, and the ability to perform avoidance and escape responses. There is also evidence that it may retard alcohol metabolism.

At least two studies have found that reserpine-alcohol combinations lengthen reaction time in humans. More substantial evidence from

animal studies shows increased impairment with this combination.

Antidepressant Drugs

Few studies have examined the combined effect of alcohol and antidepressant drugs. Monoamine oxidase inhibitors used as antidepressants, when combined with alcohol, can lead to a hypertensive crisis with symptoms of nausea and severe headaches. Alcohol can also interact with these drugs in the brain, since both have major effects on brain neurotransmitters. Of the tricyclic antidepressants, those which are predominantly stimulants (for example, desipramine) have a tendency to slightly antagonize depressant effects of ethanol, while those which are predominantly depressants (amitriptyline, Elavil®) can potentiate ethanol's depressant effects. Alcohol in combination with amitryptiline has been found to decrease motor coordination and reaction time. Tricyclic antidepressants also may lower the threshold for convulsions and should be administered cautiously during alcohol withdrawal.

Stimulants

Although theoretically CNS stimulants such as caffeine and the amphetamines should antagonize the depressant effects of alcohol, this has been difficult to demonstrate in the laboratory. Stimulants may decrease the lethal effects of alcohol, but results of a variety of behavioral, mental, and psychomotor tasks have been quite variable. In some cases combined use of alcohol with stimulants may produce hyperexcitability. It is particularly important that caffeine is at best only a weak antagonist of alcohol's depressant effects and does not significantly improve driving performance in the intoxicated individual. Usually, when alcohol's effects are reduced by stimulants, the reduction is small, is limited to only a few behaviors, or cannot be related to the drug.

Methylphenidate (Ritalin®) is similar to the amphetamines in its interactions with alcohol. Pentylenetetrazol has been used to treat alcoholic coma but has the dangerous effect of inducing convulsions.

Several other drugs, although not technically stimulants, have been suggested as possibly effective in reversing alcohol intoxication. These drugs, referred to as amethystics, include L-dopa, aminophylline, and propranolol, although more recent research indicates that propranolol's effects may be additive to those of alcohol. (Amethystic agents are discussed in Chapter III, Biomedical Consequences of Alcohol Use and Abuse.)

Anticonvulsants

Little work has been done on the interactions of alcohol with anticonvulsants such as diphenylhydantoin (Dilantin®). Some evidence suggests that diphenylhydantoin may potentiate alcohol effects and is probably ineffective in controlling convulsions associated with alcohol withdrawal. More importantly, chronic alcohol use may produce metabolic tolerance to anticonvulsants, and epileptics who are also heavy drinkers may not be receiving adequate dose levels of their anticonvulsant medication.

Antihistamines

Antihistamines are used to control symptoms of allergy and motion sickness. Despite their sedative effect and their widespread over-the-counter sales, comparatively few studies have been made of the behavioral consequences of combining them with alcohol. However, the bulk of the existing evidence suggests at least an additive, and possibly a potentiating, interaction of the two. Clearly this combination should not be used when complex behavioral tasks, such as driving or operating machinery, are to be undertaken.

Anesthetics

Studies indicate that care must be taken when using ether or chloroform to anesthetize alcoholics or other persons who have been ingesting alcohol. While greater amounts of these agents are necessary to induce adequate anesthesia in the presence of alcohol, a deeper narcosis is produced due to a supra-additive interaction. The result is increased sleep time and a greater possibility of death. In chronic alcoholics, a cross-tolerance to a wide variety of anesthetics has been observed.

Ethanol Analogs

The ethanol analogs chloral hydrate and paraldehyde are sometimes used to treat alcohol-

ics, the former as a hypnotic and the latter as a sedative in alcohol withdrawal. Both these drugs, however, have supra-additive effects when used with alcohol and can cause respiratory depression, cardiovascular changes, and death. The combination of chloral hydrate with alcohol has also been shown to impair performance on tests of psychomotor abilities.

Morphine and Other Opiate Derivatives

Evidence suggests that most opiate derivatives, such as morphine and heroin, have a potentiating effect on alcohol's depressant effect. Opiates have been reported to be involved frequently in deaths due to alcohol-drug combinations. In addition, chronic use of alcohol may sensitize the individual to the lethal effects of opiates, and vice versa. This is especially important, as a large proportion of heroin addicts and methadone maintenance patients are also heavy users of alcohol.

Marihuana

Considerable evidence now indicates that the use of marihuana impairs human-machine interactions such as driving, and that this impairment is greater when alcohol and marihuana are combined.

Researchers have found that both mental arithmetic scores and pursuit tracking ability were more impaired with alcohol and marihuana combined than with either drug alone. When a subject's attention was divided, the ability to monitor visual signals in central and peripheral vision was decreased. A marihuana-alcohol combination produced greater deficits of standing steadiness, manual dexterity, psychomotor skill, vigilance, information processing, and oculomotor control than did either drug alone. Those who use these drugs in combination should be alerted to this danger. Although there are no clinical reports of physiologic dangers associated with using marihuana and alcohol together, one study showed significant increases in both heart and pulse rates with combined use.

Drugs Producing Alcohol Intolerance

Disulfiram (Antabuse®) is the best known of the drugs that produce marked adverse and unpleasant reactions when combined with alcohol and that are used to promote abstinence in alcoholic patients. Calcium carbimide, sulfonylurea, and disulfiram apparently interfere with some aspect of the metabolism of alcohol, either the transformation of alcohol to acetaldehyde or its further subsequent metabolism. However useful in the treatment of alcoholism, this reaction can also be an unpleasant side effect of drugs used to treat other disorders.

Other Interactions

Several classes of drugs, including various oral antidiabetic medications and antibiotics, may produce disulfiram-like reactions following alcohol ingestion. Alcohol can also dangerously increase the anticoagulant properties of warfarin-type drugs, possibly by inhibiting enzymes that normally inactivate these drugs. It can produce an additive hypotension in individuals taking antihypertensive drugs (methyldopa, Aldomet®), presumably because it produces renal and peripheral vasodilation. Patients being maintained on these types of medications should be advised to avoid using alcohol.

It has been suggested that alcohol dissolves the tars found in tobacco smoke, making them more available to body tissues, particularly in the head, neck, and esophagus. The resultant increase in risk for cancer, detailed more fully in the cancer section of the biomedical chapter, is significant, since heavy drinking appears to be associated with heavy smoking. A similar mechanism may be responsible for the increased toxicity of other chemicals, such as metals and organic solvents (for example, carbon tetrachloride), with alcohol use.

Chronic alcoholics and heavy drinkers require special consideration when being treated for other disorders. The impaired liver function of these individuals may result in increased sensitivity and exaggerated responses to various drugs. For example, insulin and oral antidiabetic medications may produce extreme hypoglycemia in these patients. Anticoagulants can produce severe gastric hemorrhage in alcoholics. Conversely, cross-tolerance to other drugs, most notably other CNS depressants and anticonvulsants, may result in normally indicated doses of these medications being ineffective.

Summary

- Despite the known ill effects of combining alcohol with other drugs, combined use abounds and has grown during the last three decades as Americans have increased their use of all types of drugs—prescription, over-the-counter, and illicit. This is the first time that the available research information has been included in the Special Report to the Congress on Alcohol and Health. The research results show that combined use can both increase physiologic danger and cause substantial behavioral change.

- Drinkers are especially likely to use psychoactive substances nonmedically. Among adults who have used marihuana, more than one-fourth have combined it with alcohol; similarly, one-fifth of all cocaine users have combined its use with alcohol. The prevalence of combined use is greatest among regular or more frequent users of drugs or alcohol.

- Nationally, alcohol in combination with other drugs is the second most frequent cause of drug-related medical crises. The minor tranquilizers are the drugs most frequently combined with alcohol and can increase the deleterious effects of alcohol on performance skills and alertness. In combination with alcohol, some of these tranquilizers can fatally depress cardiac functioning and respiration.

- Combined use of alcohol and other drugs frequently has supra-additive effects. These effects can be medically hazardous and occasionally are fatal. Impaired ability during performance of tasks such as driving is also dangerous, especially when the hazards are not recognized.

- A wide variety of drugs, not limited to psychoactive agents, can interact with even small amounts of alcohol. In addition, chronic or heavy use of alcohol can result in altered responsiveness to the effects of other drugs and vice versa.

Chapter VI.

Psychological Effects of Alcohol

Alcohol has wide-ranging effects on human behavior. This chapter describes some recent discoveries on the ways that alcohol alters sensorimotor processes, attention, memory, conceptual processes, and emotions. Comprehensive reviews of the effects of alcohol on other psychological processes, as well as of animal studies in the field, are available in the literature. A discussion of psychological antecedents of drinking problems, including personality and emotional predispositions to alcoholism, was included in the First Special Report to the Congress on Alcohol and Health (1971).

Sensorimotor Processes

Motor impairments, such as unsteady balance, a staggering walk, and slurred speech , are probably the most obvious behavioral characteristics intoxicated people exhibit. Recent comparative tests have shown that of all functions tested, body sway is the one most sensitive to alcohol and can indicate significant impairment at a fairly low blood alcohol level.

Research on vision has shown that simple visual functions are generally insensitive to alcohol. However, low doses of alcohol prolong the time required for recovery from glare, producing a period of relative blindness that can be particularly hazardous for intoxicated drivers. Alcohol also impairs the ability to adapt to variations in light. When viewing a traffic film after drinking, subjects paid less attention to peripheral objects and focused more on central aspects of the scenes. One study of heavy drinkers revealed that alcohol produced a significant reduction in visual search behavior of subjects viewing driving scenes.

Alcohol also impairs performance on tracking tasks that involve eye-hand coordination. Relatively low levels of alcohol have been found to impair ability to perform pursuit tracking tasks, which involve positioning an object in relation to another moving one, when information must be processed from more than one source or in conjunction with another task. Compensatory tracking ability, which involves keeping an object in position, seems to be less sensitive to alcohol's effects.

Attention, Memory, and Conceptual Processes

Although alcohol usually does not affect concentrated attention when only one source of incoming information is involved, alcohol has detrimental effects on the capacity to absorb information from more than one source simultaneously. Research findings suggest that alcohol may impede the brain's capacity to switch from one source of information to another.

After taking acute doses of alcohol, both alcoholic and nonalcoholic individuals suffer significant loss of memory functioning. These losses occur in nonalcoholic drinkers after taking considerably smaller amounts of alcohol than those that produce the alcoholic blackout. These blackouts involve amnesia without loss of consciousness and are related directly to memory loss during intoxication.

Memory storage processes are particularly vulnerable to disruption by alcohol. When intoxicated, people have considerable difficulty processing new information and recalling that information later. Another effect of alcohol on the cognitive processes is state dependency, which is the phenomenon that information learned in one state—either sober or intoxicated—is recalled better in that state than in the other.

Sober alcoholics often display serious impairments in cognitive functioning. Although the deterioration may not be pervasive on full-scale

IQ test scores, losses occur in visual-spatial abstracting abilities, conceptual shifting, perception, and motor performance. Evidence increasingly suggests that the direct toxic effects of alcohol or of its metabolites are involved in the intellectual impairment, and that the level of cognitive impairment is directly related to the duration of alcoholism.

Many alcoholic patients have cortical and subcortical atrophy. Yet little is known about the implications of this central nervous system dysfunction for an alcoholic's job performance, social interactions, and marital stability. Whether the impairments also could retard the therapeutic process is a question that concerns some therapists.

Recent evidence indicates that alcohol may take its toll on the sober cognitive functioning of social drinkers as well as of alcoholics. A study of middle class men employed in high level occupations revealed that performance on tests of abstraction and adaptive abilities showed a significant negative association with the amount of alcohol the men reported consuming. That is, those who drank larger amounts per drinking occasion performed more poorly when tested while sober. The pattern was strongest in heavy drinkers, but it was also evident in light and moderate drinkers. Clearly, the extent to which social drinking produces deficits in cognitive performance is an important area for future research, as are the psychosocial consequences of decreased intellectual functioning, their potential reversibility, and the safe limits of social drinking.

Emotions

Tension

Empirical investigations have shown that drinking increases during some stressful situations, especially those which the drinker perceives as threatening to self-esteem. Drinking also increases in tense situations over which individuals feel they have little or no control.

Studies have yielded conflicting results on whether drinking reduces feelings of tension and anxiety in social drinkers. However, male alcoholics have been found to become more anxious, depressed, and angry when drinking heavily. Interestingly, these effects were not found in female alcoholics.

Aggression

Research indicates that alcohol increases aggression in certain circumstances but not in others. When male social drinkers drank in a competitive group situation, interpersonal aggression increased significantly. In contrast, when male-female couples interacted in an unstructured way, neither aggression nor hostility increased systematically in the drinking subjects.

In a laboratory setting, intoxicated individuals tended to set higher electro-shock levels for "victims" than did sober people. Yet the level of shock assigned was related to the aggressor's perception of the victim; a person who was seen as helpless would receive no more shock from an intoxicated subject than from a sober one.

Subjects' expectations about alcohol are highly relevant: those who believed they had drunk alcohol acted more aggressively than those who thought they had consumed a nonalcoholic beverage, regardless of the actual contents of the drinks.

Experimental Considerations

Several studies indicate that greater behavioral effects are produced at a given blood alcohol level when the level is rising than when it is falling. In addition, rapid consumption of alcohol produces greater detrimental effects than slower consumption. Differences in subjects, such as past drinking history, personality, and race, also influence alcohol's effects on behavior. The drinking environment is particularly important when assessing the effects of alcohol on emotions. Moderate doses of alcohol seem to produce a state of increased responsiveness to environmental stimuli.

Summary

- Alcohol impairs the visual functions of glare recovery, light adaptation, detection of objects in the peripheral visual field, and visual search. These detrimental effects of alcohol are particularly hazardous for the intoxicated driver.

- Performance on tracking tasks such as those required by automobile drivers or airplane pilots is decreased significantly at low blood alcohol levels.

- Memory is strongly affected by alcohol. Information learned by a person who has been drinking is not remembered as well as if the person had been sober. This detrimental effect of alcohol often goes unnoticed by the drinker.

- Prolonged heavy drinking is associated with a number of neuropsychological deficits. In alcoholics, a direct relationship has been found between years of alcoholism and cognitive deficits.

- Recent evidence suggests that social drinking impairs sober intellectual capacities. When tested on cognitive tasks in the sober state, people who reported drinking more alcohol had poorer performance than lighter drinkers.

- Experiments show that social drinkers consume more alcohol in stressful situations where they feel their self-esteem is threatened.

- Studies on aggression and alcohol are important for understanding alcohol-related violence. For example, research has indicated that when male social drinkers drank in a competitive group situation, interpersonal aggression increased significantly.

Chapter VII.

Genetic and Family Factors Relating to Alcoholism

In discussions of how human beings evolve, some argue that development is simply the result of "nature" or the innate genetic inheritance. Others insist how individuals act or perform is the result of "nurturing" or early environment and experiences. This controversy also has involved the causes of alcoholism. The primary difficulty is that unless an illness follows a precise Mendelian mode of inheritance, such as Huntington's chorea, it is almost impossible to separate "nature" from "nurture." Although genetic factors are not clear cut and environmental factors are numerous, further study is essential to determine the role of "nature," "nurture," or their combination in human development.

Genetic Factors

Nearly every study on genetic factors has indicated higher rates of alcoholism among the relatives of alcoholics than in the general population. Several theories attempt to explain this concentration of alcoholism in some families, including genetic predisposition and explanations that stress environmental factors such as drinking to reduce anxiety or to imitate parental behavior. The major difficulty in assessing the relative importance of heredity and environment is that parents usually provide both. Researchers trying to circumvent this problem have conducted twin, adoption, and genetic marker studies.

Twin Studies

The twin studies approach assumes that identical and fraternal twins differ only with respect to genetic makeup and that they both have a similar environment. In a study of 174 male twin pairs in Sweden, the concordance rate of alcohol abuse among identical twins was 54 percent, as compared with a rate of 28 percent among fraternal twins. In a Finnish study of 902 male twins, no difference was found between identical and fraternal twins with regard to the consequences of drinking that are often used as a criterion for diagnosing alcoholism. Frequency and amount of drinking and abstinence were more similar among identical twins. They tended to live together longer; were more alike with respect to marital status; and were more equal in "social, intellectual, and physical dominance relationships" than were fraternal twins.

Adoption Studies

In a study of 2,000 adoptees in Sweden, a significant correlation was noted between registrations for alcohol abuse among biological parents and their adopted-out sons. Similarly, results of another study indicated that individuals raised apart from their biological parents were significantly more likely to have a drinking problem if their biological rather than their surrogate parent were an alcoholic. This association occurred whether or not personal contact with the alcoholic parent existed. Also, when 55 sons of Danish alcoholics were compared to 78 sons of nonalcoholics, almost four times as many were alcoholics, although the men in this study had not been exposed to the alcoholic biological parent since early infancy. However, there was no difference in the rates of alcoholism for 49 daughters of Danish alcoholics and 48 daughters of nonalcoholics.

Genetic Marker Studies

If alcoholism could be associated with other characteristics known to be inherited, the case for a genetic cause of alcoholism would be bolstered considerably. However, genetic marker studies involving the associations between alcoholism and several such factors, including blood

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type, salivary secretions, and color blindness, have led to no conclusive results.

Alcohol and the Family

The Spouse of the Alcoholic

Family research traditionally has focused on the wife of the alcoholic because fewer women than men are alcoholics. However, as public awareness of alcoholism among women increases, research attention increasingly is being focused on the alcoholic wife, her husband, and her children.

Traditionally, nonalcoholic wives of alcoholics have been described as having dependency conflicts. Some researchers who believe that the wife of an alcoholic responds to her own sense of inadequacy by marrying a weak, dependent man frequently point to two types of data to support this hypothesis: A substantial number of women knew of their husbands' drinking problems before the marriage, and some wives become more disturbed when their husbands improve. Other investigators disagree with both observations.

In her pioneering work to define the nature and scope of the stress created by alcoholism in the family, J. K. Jackson proposed that the alcoholic's wife behaves just as any other person in unstructured situations involving conflicting goals and loyalties and in isolation from group support. Other researchers support this proposal and indicate that coping techniques vary with the stage of the husband's alcoholism. Although 94 percent of the wives in one sample remained married, most had separated from their husbands for some period of time. Of the wives whose husbands currently were abstinent, 38 percent felt that an actual or threatened separation caused the husband's sobriety.

Although little research has been done on the husbands of alcoholics, clinical observations suggest that men tend to be less tolerant than women of alcoholism in their spouses and are more likely to leave their wives and fight for the custody of their children.

Marital Interaction and the Alcoholic Couple

Interactive studies of alcoholic couples often report considerable and lengthy conflict. Wives complain about their husbands' drinking; husbands complain about their wives' behavior and attitudes. Alcoholic couples seemed to lack a clear, shared concept of masculinity and were confused about the male sexual role—a confusion typically expressed in conflicts about dependency needs.

One study relating interaction to treatment outcome evaluated couples in which the husband had been referred to an outpatient clinic for treatment of a drinking problem. One year later, a good or poor treatment outcome was determined on the basis of each spouse's description of the husband's behavior. Among poor outcome couples, the wives gave and received little affection and used few socially desirable phrases to describe their husbands while sober. For their part, the husbands participated little in family tasks. Both spouses expressed pessimistic opinions about the future of the marriage.

Another study focused on the communication patterns between alcoholics and their spouses during interactional game playing situations. In general, alcoholic couples communicated less successfully because they failed to interact cooperatively. A rigid, competitive, and unsuccessful style characterized the alcoholic marriage.

Children of Alcoholics

Considerable evidence indicates that the risk of alcoholism is increased by childhood family conditions that impair or disrupt the emotional bonds between parents and child. A large proportion of alcoholic patients suffered disrupted childhoods due to parental death, divorce, or desertion. The alcoholic man often had a closer relationship with his mother than with his father, and typically, he might have had a dominant mother and an openly antagonistic father. Researchers also have noted an increased probability of alcoholism in last-born children, a tendency that increased progressively with larger family size.

Children of alcoholics have a high frequency of alcohol misuse, antisocial behavior, neurotic symptoms, and psychosomatic complaints. A variety of complex factors may interact to produce disturbances in these children including the personality characteristics of both the alcoholic and nonalcoholic parents, family disorganization, the sociocultural position of the family, and possibly a genetic predisposition to alcoholism.

In one study, children of alcoholic fathers were more likely to be admitted to inpatient and outpatient medical facilities for illnesses with no apparent organic cause. Furthermore, the impact of paternal alcoholism varied according to the age and sex of the child. Among children who were outpatients and inpatients in mental health facilities, boy and girl outpatients between the ages of 4 and 12 had the same average number of symptoms; after this age, the average number of symptoms in girls increased with age. Among inpatients, the sample included twice as many boys as girls until puberty, when the proportion of girls rose.

It appears, too, that parental alcoholism may be related to delinquency and hyperactivity in children. For example, many adolescents treated in a hospital alcoholism unit for drinking problems were referred by the courts because of their delinquent behavior, and most had alcoholic fathers. The association between childhood hyperactivity and parental alcoholism also has been supported in recent studies. One study showed that the parents of hyperactive children had higher adult diagnoses of alcoholism, hysteria, or sociopathy, and that 10 percent of those in the sample were themselves hyperactive as children.

Most studies assessing psychological functioning in children of a sample of alcoholics have shown a high incidence of emotional disturbance. In one, 43 percent of such children aged 10 to 16 years were considered very seriously damaged. The children had a difficult time establishing and maintaining friendships, experienced problems in school, and failed to take advantage of recreational programs.

A positive identification with either parent appears to be an important factor contributing to success in treating children of alcoholic fathers. The least favorable results have been noted among children who identified closely with their fathers and whose mothers considered them to be "bad" like their fathers. In identifying with an alcoholic parent, a child may emulate the parent's antisocial and self-destructive behavior, including a vulnerability to alcoholism. There is, however, no convincing explanation of why one child develops an alcohol problem and a sibling does not.

The Whole Family Concept of Alcoholism

The family is conceptualized as a social system with interdependent parts whose effective functioning is contingent on each member's fulfilling his or her role responsibilities. When one member, such as the alcoholic, cannot or will not behave accordingly, the sensitive homeostasis is disrupted and a crisis ensues. In fact, some theorists maintain that alcoholism is a symptom of a family problem, rather than the central problem.

In one of the applications of this systems concept to the alcoholic family, the alcoholic marriage is seen as a mechanism highly resistant to change. The spouses make an implicit interpersonal bargain in which each partner's behavior complements the other's, and any attempt by one spouse to change behavior threatens the equilibrium of the marriage and provokes resistance in the other. Each side of the prominent conflicts between the couple is alternately expressed in the behavior of one spouse, then the other, corresponding to changes from a sober to an intoxicated state.

Other investigators suggest that the perpetuation of drinking problems across generations also can be explained in systems terms. In families in which one parent had an alcohol problem, resulting in the alteration of some family rituals, the offspring seemed more likely to develop alcohol problems.

Information now accumulating on the alcoholic family has strong implications for the treatment of alcoholism, making the future of family therapy seem promising. Although alcoholics may resist treatment, the family members may be eager to participate and to provide crucial support during particularly difficult periods. Furthermore, the process of making the family the patient allows the alcoholic to reenter the family life as an active and equal participant. Finally, family therapy could provide an excellent vehicle for revealing those interactional systems that underlie and support continued problem drinking in many families. Clearly, other significant people in the alcoholic's life including fellow workers, friends, supervisors, and physicians also may play a crucial role in successful therapy. Further studies are needed to evaluate the efficacy of family therapy.

Summary

- Assessing the relative importance of heredity and environment is difficult. Although studies suggest that genetic factors are involved, they provide no details on how a predisposi-

tion to alcoholism is transmitted. However, adoption studies involving genetic factors related to alcoholism suggest that male children of alcoholic parents are more likely to have a drinking problem whether or not any contact with the alcoholic parent occurred.

- Family studies also provide evidence that the risk of alcoholism is increased by childhood conditions that impair or disrupt the emotional bonds between parent and child.

- Family research traditionally has focused on the wife of the alcoholic because fewer women than men are alcoholics. However, as public awareness of alcoholism among women increases, research attention increasingly is being placed on the alcoholic wife, her husband, and her children.

- Among couples whose treatment outcome was predictably poor, the wives of alcoholics gave and received little affection and used few socially desirable phrases to describe their husbands' sober behavior. For their part, the husbands expected few positive descriptions and participated little in family tasks. Both spouses expressed pessimistic opinions about the future of the marriage.

- Many therapists have begun to treat the whole family rather than the individual when alcoholism is present, although additional research on the efficacy of this approach is needed.

Chapter VIII.

Alcohol-Related Accidents, Crime, and Violence

Violence, accidental or intentional, constitutes a substantial part of all mortality, illness, and impairment in the United States. Violence plays an especially prominent role in death and injury among younger age groups. For example, accidents are the leading general cause of death for all ages from 1 to 38. Research shows that alcohol often plays a major role in such violent events as motor vehicle accidents; home, industrial, and recreational accidents; crime; suicide; and family abuse.

Motor Vehicle Accidents

Traffic accidents are the greatest cause of violent death in the United States, and approximately one-third of the ensuing injuries and one-half of the fatalities are alcohol related. In 1975, as many as 22,926 traffic deaths involved alcohol. Experimental studies have demonstrated that alcohol causes degeneration of driving skills and impairment of judgment. However, the full extent to which alcohol use results in traffic accidents due to these impairments is unknown.

General research trends seem to support the following facts concerning the relationships of alcohol and traffic crashes: (1) As many as 25 percent of drivers in nonfatal crashes and 59 percent of drivers in fatal crashes had blood alcohol concentrations (BAC's) of 0.10 percent or higher. (2) Up to 29 percent of passengers in fatal accidents showed BAC levels in the legally impaired range. (3) Alcohol could be involved in up to 83 percent of pedestrian fatalities. (4) As many as 72 percent of drivers in single-vehicle fatalities and 51 percent of drivers in multivehicle fatalities had BAC's of 0.10 percent or higher. (5) Of the drivers in multivehicle fatal crashes with BAC's in the high range, 44 percent were judged by researchers to be responsible for the crashes, compared to 12 percent judged not responsible.

Data on alcohol involvement in crashes based on police reports indicate that the proportion of drivers who were drinking at the time of a crash increases in relation to the severity of the crash. Studies have shown also that a larger proportion of men than women were drinking at the time of the crash, and that most alcohol-related accidents occur at night.

Relative Risk of Crash Involvement

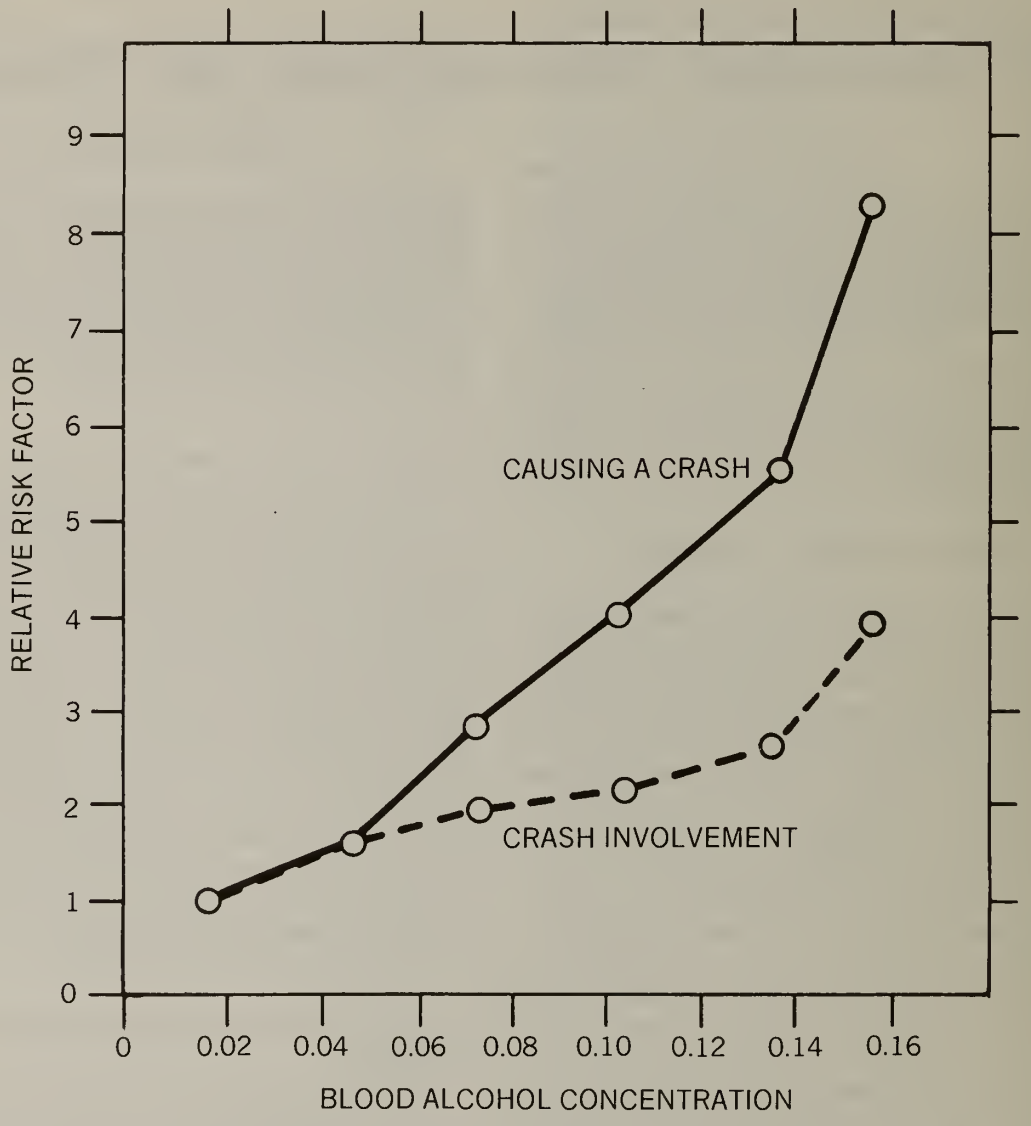
In general, the relative probabilities of crash involvement and causation increase dramatically as the driver's BAC increases. As figure 1 illustrates, at a BAC of 0.05 the relative risk factor for crash involvement and causation is 1.5 times that at the 0.02 level. When the BAC is 0.10, the relative risk factor doubles for crash involvement and quadruples for causing a crash. With a BAC of 0.16, the likelihood of being involved in a crash is four times greater than at the 0.02 level, and the likelihood of causing a crash is eight times greater. At all BAC's, male drivers in the age groups of 18 to 24 years and 65 years and older are more likely to be involved in a crash than all other male drivers.

Drinking Patterns of Traffic Casualties and Offenders

Several studies have shown that only small proportions (3 to 9 percent) of drivers convicted of driving while intoxicated (DWI) or involved in accidents are identifiable as alcoholics on the basis of past treatment for alcoholism at a hospital or a clinic. However, when multiple criteria were used, 37 percent of DWI arrestees were identified as alcoholics and 48 percent were identified as persons with serious drinking problems.

The driving records of known alcoholics show that this group has significantly greater

Figure 1. Relative Probability* that a Driver Causes and Is Involved in a Crash as a Function of BAC Level



SOURCE: Marc Aarens, Tracy Cameron, Judy Roizen, Ron Roizen, Robin Room, Dan Schneberk, and Deborah Wingard, *Alcohol Casualties and Crime*. Special report prepared for National Institute on Alcohol Abuse and Alcoholism under Contract No. ADM 281-76-0027. Berkeley, CA: Social Research Group, University of California. 1977.

*Relative to the probability that a driver with a BAC of less than 0.03% is in or causes a crash.

numbers of traffic accidents and violations than does the general driving population. In 1975, there were 45,853 traffic deaths, an estimated 22,926 of which were alcohol related, including the 10,546 that may have been related to alcoholism. However, data also indicate that accident involvement for all persons, including alcoholics, is a complex phenomenon, influenced at least partially by such factors as acute stress and disturbing events. Evidence also exists that involvement in traffic incidents actually may bring alcoholics into treatment.

Home, Industrial, and Recreational Accidents

Alcohol also has been seriously implicated in death and injury resulting from home, industrial, and recreational accidents. A national survey found that 36 percent of regular drinkers and only 8 percent of nondrinkers reported two or more accidental injuries in the previous year. Heavier drinkers appear to have more accidents than other people, and alcoholics have a considerably higher rate of accidental death than the general population.

Industrial Accidents

Occupational accidents affect a substantial portion of the population. One researcher reports union estimates of an annual toll of 18,000 deaths and 10 million injuries resulting from industrial accidents. Up to 47 percent of nonfatal industrial accidents and up to 40 percent of fatal industrial accidents are alcohol related. Experimental evidence has shown that alcohol inhibits coordination and judgment, lengthens reaction time, and decreases motor performance and sensory skill in simulated industrial work. Studies show that problem drinkers are as much as three times more likely to be involved in industrial accidents than the general population.

Aviation Accidents

A substantial proportion of general (noncommercial) aviation crashes may be related to alcohol use at the time of the accident as indicated by data showing that as many as 44 percent of the pilots who were involved in accidents had been drinking. Alcohol might contribute to aviation accidents and deaths through increased risk-taking and inhibited psychomotor performance, which several investigators think occur at BAC's as low as .04. Unfortunately, corresponding studies are not currently available for commercial pilots.

Drownings

Alcohol use is associated with up to 69 percent of drownings. Boating accidents could be caused by poor judgment, faulty coordination, and lack of attention associated with alcohol. Swimmers may take more risks, and the "pseudo-warmth" effect of alcohol may encourage people to stay in cold water too long. When drinking at home, a person might fall into a swimming pool or a full bathtub due to poor coordination, be knocked unconscious, and drown. In any of these situations, alcohol may depress the swallowing and breathing reflexes.

Fire and Burns

Alcohol use and alcoholism have been implicated in the cause of fires and in the failure to detect or escape from them. Although young children and adults 65 years and older are overrepresented in fire deaths, alcohol is found predominantly in middle-aged male fire victims. Up to 83 percent of all fire fatalities and 62 percent of all fire burns involved alcohol use at the time of the accident; 53 percent of the fatalities and 23 percent of the burn victims were alcoholics. One reason for these high figures is that alcohol lowers oxidation in the cells and increases a person's chances of succumbing to smoke inhalation and suffocation. Cigarette smoking is a major cause of fires, and a direct association exists between drinking and smoking in the general population. Alcohol is involved in nearly three times as many deaths from cigarette-caused fires as in deaths in fires resulting from other causes.

Falls

Balance and locomotor coordination are severely impaired in people who have consumed alcohol, thereby increasing the risk of falls. Alcohol has been found to be involved in up to 70 percent of all deaths and 63 percent of all injuries from falls. One study reported that 44 percent of deaths from falls involved alcoholics.

Other Accidents

What little information exists suggests that alcohol is very common in many other types of accidents, including food asphyxiation deaths, hypothermia, frost injuries and deaths, snowmobile injuries, and tractor accident deaths.

Alcohol and Crime

No one knows the full extent to which alochol is responsible for crime, but it can be involved in formulating a crime, aggravating its course, or affecting the outcome. Some alcohol-related crimes, such as public drunkenness, disorderly conduct, and vagrancy, have shown a substantial downward trend between 1965 and 1975. This is due largely to the decriminalization of public intoxication in 28 States, Puerto Rico, and the District of Columbia. However, all alcohol-related crimes, including driving-while-intoxicated and liquor law violations, still accounted for 38 percent of FBI-reported crime in 1975. This underestimation of the total role of alcohol in crime does not include such crimes as robbery, assault, and rape in which alcohol was involved. Unfortunately, it is very difficult to derive estimates on the use of alcohol in unsolved or undetected crimes; most research on alco- hol and crime is based on data from either arrestees or prison inmates. Arrest record information provides the most detailed crime information and prison population studies typically focus on characteristics of a selected sample of criminal offenders.

Research on Arrested Populations

The relationship of alcohol to criminal behavior varies by type of crime and by the roles of participants in criminal events. Most alcohol-involved violent crime includes both a drinking victim and a drinking offender.

Robbery. One study estimates alcohol involvement as high as 72 percent in robbery offenders. Although the vulnerability of skid row alcoholics to robbery is common knowledge, alcohol use by other robbery victims is relatively unexplored.

Rape. Estimated alcohol involvement ranges as high as 50 percent in sex offenders and 31 percent in rape victims. The most extensive American study on the subject found that in 63 percent of rapes where alcohol was involved at all, both victim and offender had been drinking. Another important finding was that the type and extent of alcohol involvement in rapes was related to the interpersonal relationship of the victim and the offender.

Assaults. Estimates of alcohol involvement in reported assaults vary widely, ranging up to 72 percent of the offenders and 79 percent of the victims.

Homicide. Research based on coroners' reports and detailed case studies suggests that large percentages of offenders and victims had been drinking at the time of the crime. Most studies showed that 40 to 60 percent of homicide victims and up to 86 percent of offenders had been drinking when the murder was committed. The presence of alcohol appears to be most likely in homicides where (1) the victim is stabbed, (2) the situation was already violent, and (3) the victim seemed to have precipitated the murder.

Research on Prison and Alcoholic Populations

As many as 83 percent of offenders in prison or jail have reported alcohol involvement in their crimes. While drinking often has been thought to be associated more with crimes against persons than against property, prison data indicate that drunkenness is just as frequent in both. As high as 66 percent of prisoners report drinking problems, but because prisoners seem to have more problems of all kinds than the general public, no causal relationship between drinking problems and criminal activity can be assumed.

Chronic inebriate offenders, excessive drinkers, and alcoholics in treatment have criminal behavior records far in excess of those expected in a sample of the general population. Research on chronic inebriate offenders suggests that if a serious crime is committed, it occurs early in the criminal career, followed by a longer career of offenses involving drunkenness.

Alcohol and Suicide

In 1975, 27,063 people in the United States were reported as suicides, making suicide a major cause of death in this country. It is estimated that as many as 10,000 of these deaths, more than one-third, were related to alcohol. Some studies show that alcohol may be involved in up to 64 percent of suicide attempts, and evidence indi-

cates that the extent of intoxication during suicide attempts may be vastly underreported.

Alcohol's mood-changing properties have been seen as a possible link to suicidal actions. People who want to reduce depression often drink to do so, not realizing that large quantities of alcohol actually can increase both anxiety and depression. Other theorists suggest that alcohol could precipitate a suicidal act by decreasing the critical, life-evaluating functions of the ego, allowing unconscious, self-destructive impulses to gain control. It is also possible that some impulsive suicidal attempts may result from an outburst of aggression turned toward the self. In addition, the association between the use of alcohol in combination with other drugs is probably responsible for a portion of the accidental and intentional suicides (see Chapter V, Interaction of Alcohol and Other Drugs).

Alcoholics form a substantial portion of suicidal populations. Most studies show that 10 percent of suicide victims are alcoholics, and many studies report 20 percent or more. Up to 25 percent of alcoholics reported having attempted suicide before they either sought treatment or stopped drinking. It has been estimated that up to 8,400 alcoholics committed suicide in 1975.

Alcoholics are far more likely than nonalcoholics to attempt and commit suicide while drinking. The explanations for this phenomenon vary: some theorists consider alcoholism as an indication of a suicidal personality; others feel that alcoholism, per se, often may cause suicide. Most agree, however, that alcoholism often involves deterioration of important social relationships, leading to social disintegration, loss of memory, and other precipitants of suicide.

Alcohol and Family Abuse

Child abuse, neglect, and molesting, and marital violence are prevalent types of aggression in the family. Although empirical data on alcohol involvement are quite limited, there are indications that intoxication is a precipitating factor in many cases of child abuse. The largest American study on the subject reported that 38 percent of child-abusing parents had histories of drinking problems, and other studies have shown that up to 65 percent of child abuse cases are alcohol related. Research also suggests that quarrels originating over one spouse's drinking eventually can result in physical aggression, although data are extremely limited. One study reported that 52 percent of violent husbands had histories of problem drinking or alcoholism.

Recent research has suggested that child molesters often use drunkenness as an excuse for their offenses. This may be the result of alcohol's short-term effect of lessening awareness of the boundaries between acceptable and unacceptable behavior, as well as the general social and physical deterioration associated with the continued abuse of alcohol.

Summary

- Alcohol is significantly involved in motor vehicle accidents; home, industrial, and recreational accidents; crime; suicide; and family abuse. Accidents and violence play an especially prominent role in death and injury among the younger age groups.

- Half of all traffic fatalities and one-third of all traffic injuries are alcohol related, according to current estimates.

- Drinking by drivers plays a greater role as the severity of the crash increases. Up to 59 percent of fatal crashes and 25 percent of nonfatal crashes involve drinking drivers with blood alcohol concentrations (BAC) of 0.10 percent or higher.

- The probability of crash involvement increases dramatically as a driver's BAC increases. The relative risk factor of being involved in or causing a crash at a BAC of 0.05 percent is one and one-half times that at 0.02 percent. At a BAC of 0.10 percent, compared to 0.02, the relative risk doubles for being involved in a crash and quadruples for causing a crash.

- At all BAC levels, male drivers aged 18 to 24 years or 65 years and older are the most likely to be involved in a crash.

- In studies in which multiple criteria are used, up to 37 percent of DWI (driving while intoxicated) arrestees are identified as alcoholics, and a total of 48 percent are identified as persons with serious drinking problems.

- A significant number of industrial and aviation accidents, drownings, burns, and falls have been attributed to drinking. Studies have found that up to 40 percent of fatal

industrial accidents, 69 percent of drownings, 83 percent of fire fatalities, and 70 percent of fatal falls were alcohol related.

- While information on the role of alcohol in crime is limited, studies show relatively high involvement of alcohol in robbery, rape, assault, and homicide. Alcohol-involved crime often includes both a drinking offender and a drinking victim.

- More than one-third of all suicides involve alcohol, and disproportionately high numbers of people with drinking problems commit suicide. In 1975, as many as 10,000 suicides were related to alcohol use, and up to 8,400 alcoholics committed suicide.

- Alcohol and family abuse is a neglected area of research. Excessive drinking has been implicated in child abuse, child molesting, and marital violence. A large number of child abusing parents have histories of drinking problems.

- There is a great need for improved (definitive) epidemiologic data on alcohol-related deaths, injuries, and acts of violence, including determining the proportion that is directly attributed to the alcoholic population.

Chapter IX.

Treatment of Alcoholism and Problem Drinking

This chapter supplements and updates the Second Special Report on Alcohol and Health and discusses five major treatment issues: goals, methods, effectiveness, resources, and barriers.

Treatment Goals

Traditionally, the major goal of treatment has been abstinence based on the assumption that the disease could not be cured, but that its course could be arrested by total abstinence from alcohol. This concept is taught as a tenet in Alcoholics Anonymous and dominates current treatment practices of most other organizations.

The consensus has been challenged recently by advocates of an alternative goal—a return to some form of nonproblematic drinking. Some adopt this view on the theory that alcoholism is the result of a learning process, and treatment is seen as a process of helping the alcoholic to "unlearn" harmful drinking habits and to adopt nonalcoholic drinking patterns. Others tend to regard alcoholism as symptomatic and secondary to an underlying personality disorder, alleviation of which may not necessarily involve abstinence. A resumption of drinking by some alcoholics without severe consequences has been reported in several studies.

Advocates of the abstinence goal stress that clinical experience reveals countless futile attempts by alcoholics to return to controlled drinking. They argue further that the frequency of this phenomenon is so low that it has no practical significance.

Those supporting alternatives to abstinence assert that the instances of controlled drinking are conceptually important because they controvert the hypothesis that alcoholism can be contained but not reversed. They note as well that abstinent alcoholics may not improve or may even deteriorate in other dimensions of health and well-being. The validity of the clinical experience has been questioned on the grounds that it entails biased sampling, failure to follow up, or a tendency to generalize from a small sample.

The conflict between abstinence advocates and controlled-drinking advocates is a product of deep conceptual differences. Nevertheless, new viewpoints are emerging that incorporate elements of both concepts. These approaches argue that most alcoholics should abstain, particularly those with irreversible physical damage, those with chronic failure to learn controlled drinking, those with a strong belief in the abstinence goal, and those who are more comfortable as abstainers. For others, particularly the younger problem drinker or alcoholic who does not accept or cannot fulfill a prescription of lifetime abstinence, controlled drinking may be the preferred goal. Only future research will resolve these issues and enable health professionals to determine whether it is possible to distinguish those for whom one goal is more successful than the other. In the interim, NIAAA continues to endorse abstinence as the most appropriate treatment goal for alcoholism.

While attention has been focused on the controlled-drinking issue, other approaches to treatment goals have begun to emerge slowly. In many cases multiple treatment goals are considered necessary. In this view, the control or elimination of alcohol consumption is considered important only in the context of improvement in areas of social, psychological, and behavioral functioning. Some therapists are examining the frequency and severity of individuals' drinking problems with the view that in some instances alleviation rather than elimination of these problems may be the most realistic treatment goal.

It is likely that extending these concepts will lead to a variety of treatment possibilities rather than a rejection of any one.

Treatment Methods

The First and Second Special Reports on Alcohol and Health discussed many specific treatment approaches, including group and family therapy, individual counseling, transactional analysis, diet control, and the Alcoholics Anonymous program. Although no clearly new treatment approaches have evolved since the last report, several shifts in emphasis are apparent that are the focuses of this report. These trends include (1) increased awareness of the lack of definitive assessment of pharmacological approaches, (2) more judicious use of pharmacological agents, (3) increased experimentation with behavior modification techniques, (4) expanded concerns regarding acceptable or effective mixes of client types, and (5) accelerated efforts to develop noninstitutional and nonmedical model treatment programs.

Pharmacological Agents

Pharmacological agents often appear to be advocated and used by physicians during various stages of treatment. However, the shortage of research and evaluation oriented toward the use of these agents is evident. The typical initial enthusiasm for new drugs followed by failure to substantiate their efficacy in double-blind studies, as described in the Second Special Report, still occurs. The many causes of alcohol problems, as well as the multiple factors inevitably involved in their treatment, can lead either to false expectations or to premature rejection of therapeutic approaches using drugs. Despite the lack of conclusive evidence of their efficacy, pharmacological agents are used in detoxification and withdrawal, in the general long-term treatment of alcoholics, and to produce negative reactions to alcohol.

Treatment of Acute Alcoholic Intoxication and Withdrawal. Paraldehyde, chloral hydrate, barbiturates, and even alcohol at one time were used widely to facilitate acute withdrawal and to prevent the occurrence of delirium tremens. Recently, use of benzodiazepine tranquilizers, such as chlordiazepoxide (Librium®) has been recommended to produce a more desirable withdrawal process than other pharmacological agents. Phenothiazenes, tranquilizers frequently used for seriously emotionally disturbed patients, have not been suggested for this purpose because they tend to increase the incidence of convulsions. Furthermore, there are advocates of detoxification treatment involving no drugs whenever possible.

Alcohol Sensitizing Drugs. Drugs that produce adverse reactions when alcohol is consumed, such as disulfiram (Antabuse®) and citrated calcium carbimide (in countries other than the United States), continue to be widely used. These compounds inactivate aldehyde dehydrogenase in the liver and an unpleasant reaction occurs when a person taking them uses alcohol, causing an accumulation of unmetabolized acetaldehyde.

The drug may help an alcoholic get past momentary impulses to drink. Requiring an individual addicted to both alcohol and heroin to take disulfiram in order to obtain the methadone he or she wants as maintenance therapy has shown encouraging results. The combination has been shown to be safe.

However, widespread use of disulfiram, as in court-ordered alternatives to punishment for drunken drivers, should be undertaken with caution and only under physician supervision. People with arteriosclerotic heart disease, cirrhosis, kidney disease, diabetes mellitus, and other disorders that may involve low tolerance to acetaldehyde, should not take disulfiram. While other countries have experimented with disulfiram implants, they have not yet been approved for nonresearch use in the United States and their efficacy is not established. The use of disulfiram alone without adjunctive therapy is strongly discouraged.

Long-Term Treatment of Alcoholism. The status of drug use as part of long-term treatment remains controversial. Some argue against such use because of the risk of abuse, dependence, overdosage, and tolerance development. Others, acknowledging the risks, maintain that drug use can be important and effective. For example, withdrawal symptoms have been known to exist 6 months or longer after the withdrawal has occurred. In this situation a long-acting, cross-tolerant sedative such as chlordiazepoxide has been recommended.

In another instance, some therapists have proposed that lithium carbonate should be prescribed for depressed alcoholics. This drug has been used in many psychiatric syndromes including alcoholism. One study showed that lithium-treated depressed alcoholics had fewer alcoholic episodes; another indicated that the beneficial effect occurred only in depressed alcoholics.

Some researchers think that the purported value of lithium may be related to other effects. It seems to diminish deterioration of cognitive and psychomotor performance caused by alcohol and may block euphoria or reduce the desire to drink. Clinical trials of this and other pharmacological agents are needed to resolve current ambiguities regarding their ultimate effects.

Behavioral Therapies

Behavioral psychologists believe drinking is a learned behavior pattern involving social situations and customs, emotional and cognitive experiences, personal expectations, and reinforcing conditions. According to the behaviorists, positive or negative reinforcement comes immediately in the early rise of blood alcohol concentration, and, therefore, attention should be focused on the response of the individual to the rise of blood alcohol concentration from zero to intoxicating levels. Behavioral therapies try to reverse the pattern so that nondrinking or nonexcessive drinking brings rewards or avoids punishment.

The current trend is to observe drinking patterns and to develop techniques that will modify them. There is less emphasis on theory development. Analysis of drinking behavior focuses on cues and stimuli, attitudes and thoughts, specific drinking behavior, and consequences of drinking. Because these variables are complex and highly individualized, they require careful assessment to change the attitudes and behavior that lead to excessive drinking in a given patient. Each person requires an individually tailored plan; no one treatment is suitable for everyone.

Techniques used in behavioral therapy for alcoholism include aversion therapies; assertiveness, coping, and relaxation; biofeedback; blood alcohol discrimination training; and controlled drinking.

Treating Alcoholics and Drug Addicts in the Same Program

Treating alcoholics and drug addicts in the same program has stirred both considerable interest and controversy. In general, alcoholics tend to be older and middle class, with a history of relatively stable lives. Drug addicts usually come from lower socioeconomic backgrounds. They tend to be young, uneducated, minority group members and often have shown criminal tendencies. Opponents of combined treatment argue that these differences militate against successful results in a program with both groups. Even the combined treatment advocates recommend caution in mixing heroin addicts with skid row and lower class alcoholics, because experience has shown that there is considerable potential for conflict.

Traditionally, treatment approaches differ for the two groups: the drug addict is confronted; the alcoholic is supported. Integrating these approaches can be difficult. For some addicts, replacing their drug with a substitute such as methadone can be a significant component of their treatment; alcoholics usually are oriented toward abstinence. Although many researchers have noted the problems posed by combined treatment, little strong opposition to the general idea is evident.

Pros and cons are involved in the financial and administrative aspects as well. Although combined programs may seem to be more efficient—particularly in smaller communities—categorical funding creates serious administrative problems when treatment is combined.

Evidence to date is inconclusive: an analysis of Veterans' Administration programs provided support for separation; a nationwide survey of judgments of administrative and treatment personnel favored combined treatment; and a random-assignment study demonstrated no differences in effectiveness either within a residential program or on followup. The combined treatment of alcoholics and drug addicts appears to be feasible; its general effectiveness is yet to be determined. Analogous questions arise in relation to the separation or integration of clients by race, sex, age, and socioeconomic levels. These issues may well be resolved more by societal changes than deliberate action, particularly since evidence on relative effectiveness is not available.

Hospitals and Detoxification Centers

More hospitals have been admitting alcoholic patients in the last decade, and guidelines have been established by the American Hospital Association and the American Medical Association. Hospital policies excluding alcoholics were based on the traditional belief that alcoholics caused trouble and did not pay their bills. Despite this, many alcoholics had been admitted to acute

care hospitals although treatment focused on the biomedical consequences of the illness, not on alcoholism as a primary diagnosis.

The basic elements of hospital-based programs still include detoxification, physical rehabilitation, education about alcohol, counseling, group therapy, and Alcoholics Anonymous sessions. However, a variety of new therapies have been tried during the last decade.

Some consensus must be arrived at regarding the use of acute-care facilities in treating alcoholism. One suggestion is that an acute psychiatric facility is indicated if a psychiatric disorder exists that would require this level of care regardless of intoxication or alcoholism. Psychosis, depression, or a severe behavior disorder are examples. Similarly, an acute-care general hospital is necessary when a serious medical or surgical problem exists, regardless of intoxication or alcoholism.

Many localities have established detoxification centers to treat alcoholics who otherwise would enter jail "drunk tanks." Often, now, these operate without expensive professional staff but with support from an acute-care hospital for complications. At least one study has demonstrated the efficacy of an outpatient detoxification program. However, two defects may be associated with current detoxification programs. First, the nonmedical approach could eliminate the opportunity for early diagnosis of medical problems often seen in alcoholics. Second, the centers have been used as emergency shelters rather than as treatment centers by alcoholics looking for a place to stay rather than an opportunity to change their lifestyles. Nevertheless, there is some promise that detoxification centers can be safe and effective for the sick alcoholic, as well as economical, and an entry into comprehensive treatment programs.

The Effectiveness of Treatment

The basic evaluation question is what kinds of treatment work best for what kinds of clients. Evaluations of alcohol programs should involve criteria of improvement; types and degrees of differences in patient characteristics; and functional variations in treatment settings, methods, and staff. The reasons for confirmed improvement of alcoholics must be determined. For example, changes might be due to treatment factors themselves, patient characteristics, curative factors in the total living situation, or merely the passage of time.

Treatment Results

Most evaluation research assesses outcomes in three broad areas: alcohol consumption, behavioral (psychological and physical) impairment, and social adjustment.

Alcohol Consumption. Most researchers agree that excessive consumption of alcohol is the critical indicator of alcoholism or problem drinking. It therefore seems logical to treat consumption as a primary measure of outcome and a major component of any remission or recovery definition. In an exhaustive review of 265 studies on psychologically oriented alcoholism treatment, 80 percent had used alcohol consumption as the sole or principal outcome measure. The consumption levels of nearly 14,000 patients included in these studies were analyzed using a uniform classification system. Approximately one-third of the patients were abstinent; one-third were improved, that is, showed reduced consumption or abstention alternating with periods of excessive drinking; and one-third were unimproved or worse.

One difficulty in comparing different treatment studies is the lack of standardized definitions and measures, especially of drinking behavior. The problem is overcome to some extent in the NIAAA alcoholism information system that uses standardized and quantified outcome measures, and enables researchers to assess changes between the time a patient enters a treatment program and 6 months later when most treatment is completed. One study of programs using these measures showed substantial improvement in consumption levels 6 months after the alcoholic began treatment (table 1).

Since alcoholism is a disorder with a high likelihood of relapse, a 6-month followup may be too early to obtain reliable data on outcome. Accordingly, a special 18-month followup study was conducted in eight centers of the NIAAA-sponsored comprehensive Alcoholism Treatment Center program (table 2).

Changes in males not in treatment as a result of a driving-while-intoxicated (DWI) incident, who represented most of the patients, were similar to those shown at 6 months. However, although average consumption had been reduced considerably, only 24 percent of this group had abstained for periods of 6 months or more.

Table 1. Changes in Alcohol Consumption in Four NIAAA-Funded Programs During 1976*

Program	Drinking behavior during past 30 days: Percent Abstaining		Average Ethanol Consumed per Day (oz)		Average Number of Drinking Days		Number of Cases
	At Outset	6 Months Later	At Outset	6 Months Later	At Outset	6 Months Later	
Comprehensive alcoholism treatment program (ATC)	12	53	5.8	1.6	15	6	4280
Drinking driver program	8	44	2.5	0.8	12	5	1551
Occupational program	11	64	2.8	0.6	16	4	254
Public inebriate program	9	58	10.8	3.4	18	6	384
Average across programs	10	55	4.4	1.6	15	5	

SOURCE: Harriet Stambul, *Treatment outcomes.* Paper prepared for National Institute on Alcohol Abuse and Alcoholism under Contract No. NIA-77-10(P). April, 1977.

*All changes are statistically significant at or better than $p < 0.05$.

Table 2. Changes in Alcohol Consumption for Participants in NIAAA ATC Programs at 18-Month Followup

Group	Abstained Last Month (%)		Abstained Last 6 Months (%)	Ethanol Consumed per Day (oz)		Number of Cases
	At Outset	18 Months	18 Months	At Outset	18 Months	
Male non-DWI[1]	8	46[2]	24	8.3	2.5[2]	600
Female non-DWI[1]	13	56[2]	39	4.5	1.3[2]	158
Male DWI[1]	22	29	18	1.7	0.9	162

SOURCE: Harriet Stambul, *Treatment outcomes.* Paper prepared for National Institute on Alcohol Abuse and Alcoholism under Contract No. NIA-77-10(P). April 1977.

[1] DWI denotes enrollment in connection with a driving-while-intoxicated incident.
[2] Changes are statistically at or better than $p < 0.05$.

Relative rates of change were similar in the female non-DWI patients, although a higher percentage had experienced a prolonged abstinence. Male DWI patients showed much lower rates of abstinence and reduced consumption, but it must be stressed that their level of consumption at intake suggests that they are not necessarily alcoholics.

The results of these comprehensive reviews and national followup studies provide evidence that treatment for alcoholism has a substantial and long-term effect on alcohol consumption. It also appears that it produces reduced consumption as well as total abstinence.

Behavioral and Social Impairment. In addition to consumption levels, most definitions of alcoholism include physical or psychological dependence on alcohol; social, mental, or physical harm caused by alcohol must be shown.

One analysis has indicated that when treatment improved the drinking pattern, it generally caused positive changes in affective-cognitive functioning, work situation, interpersonal relationships at home, physical condition, arrests and other legal problems, and Alcoholics Anonymous attendance. However, the available data are not generally strong enough to support the conclusion that alcoholics who stop or moderate their

drinking necessarily improve in other areas, especially vocational and marital adjustment.

Another study demonstrated an overall change in earnings after treatment for alcoholism. The degree and direction of the change was influenced by such factors as the patient's employment record, sex, age, education, and the severity of illness.

The 6-month and 18-month followup studies on special NIAAA programs provide evidence that alcoholics experience substantial improvement in a range of behavioral impairment criteria, although not always to the same degree.

Differential Effects of Treatment

There is considerable disagreement about which criteria are appropriate for assessing results, but the evaluation literature emphasizes that, somehow, alcoholism treatment seems to help many people. The overall improvement rate across studies ranges from 30 to 70 percent, depending on how broadly it is defined. It is appropriate then to concentrate on examining differential effects of various treatment settings, durations, and mechanisms.

Treatment Setting. Systematic comparisons of treatment settings are rare in the literature. However, some findings are available that indicate patients in inpatient, outpatient, and intermediate care settings all showed relatively uniform rates of improvement. These findings raise questions about the value of the more expensive treatment settings. If quality standards are maintained, the less expensive treatment settings could produce effective results. However, a variety of settings should be maintained to serve the patient until this hypothesis is supported by other comparative studies, including those using random assignment of patients to various treatment approaches.

Amount and Duration of Treatment. Whether treatment length and treatment intensity are related to outcome is a question involving both cost and concept. In general, the length of treatment has been found to be positively related to outcome in outpatient settings. With regard to inpatient care, the evidence is equivocal.

Data from one study indicated that the total amount of treatment but not its duration was related significantly to remission status at followup interviews. Patients with more treatment had higher remission rates than those with less, whether treatment was given intensively over a short period or extended over a longer time.

Treatment Type. Several reviews of treatment studies have concluded that inappropriate experimental procedures, such as lack of random assignment or matched treatment groups, render most invalid. Where comparisons among treatment types appear valid, few differences are found. It appears that a patient's personal and background characteristics rather than any kind of therapy may play a dominant role in the outcome of treatment. Patients who are relatively higher socioeconomically and more stable socially have a better prognosis by any treatment method than those who do not have these advantages. Several studies suggest that differences observed in treatment results are more a function of patient characteristics than of the treatment provided.

Thus, a patient's background characteristics and motivation to seek help may be the essential factors in the recovery process. However, an individual's motivation for recovery must be sustained and positively reinforced by the treatment experience.

The Question of Little or No Treatment

Recent evidence is substantial that some alcoholics experience recovery apparently without treatment. In a British study, 100 consecutive admissions were assigned randomly to either an "advice" group that had only a single counseling session, or to a treatment group that received regular inpatient or outpatient care. In a 1-year followup, there were no significant differences in outcomes between the two groups. The authors of another study showing remission rates of more than 50 percent in patients who had only minimal contact with a treatment center and 70 percent among treated patients concluded that formal treatment seems to add a 20- to 25-percent chance of remission above what could be expected from no treatment.

In addition to clinical studies, epidemiological surveys and longitudinal studies have demonstrated that problem drinking is not a unilinear and necessarily progressive disorder. Apparently, individuals may cycle into and out of problem drinking.

Several factors were reported to account for spontaneous remission in one study of untreated alcoholics. Resistance to being labeled "alcoholic" and negative attitudes toward institutional

treatment were particularly important. Conditions that initiated the commitment to change drinking habits included identification with a negative role model, personal humiliation, serious health problems, a sudden religious experience, extensive exposure to educational information about the effects of alcohol misuse, and prior experience with self-control—such as quitting cigarette smoking. The study revealed that the initial commitment was not enough to resolve drinking problems. Other social conditions that were apparently critical to success included the availability of non-alcohol-related leisure activities, reinforcement from friends and family, and relative economic stability.

Treatment Resources

A variety of resources for alcoholism treatment is now available. They include alcoholism information and referral centers, alcoholism treatment centers, general hospitals, mental hospitals, community mental health centers, detoxification centers, halfway and quarterway houses, vocational rehabilitation centers, alcoholism outpatient clinics, private physicians, Alcoholics Anonymous, human service agencies, police-court systems, skid row agencies, and industrial rehabilitation programs.

In 1975 the National Association of Counties Research Foundation conducted a survey of alcohol-related services in counties with a population of 10,000 or more. Ninety-four percent of the counties reported that alcohol-related services were available. Mental health departments were most frequently cited as the source of treatment services, followed by general public hospitals, alcoholism abuse agencies, and mental health hospitals. While the mental health hospitals generally provided inpatient care, the other facilities offered outpatient care as well as other services ranging from consultation to education. An assessment of nongovernment agencies indicated that Alcoholics Anonymous was most often cited as a treatment resource, followed by voluntary and private hospitals and clinics, councils on alcoholism, and private alcoholism residential programs. Although councils on alcoholism ranked third, they offered the broadest range of services—education, consultation, management and support, outreach, aftercare, and outpatient care.

Data compiled by NIAAA indicated that there were at least 1.1 million admissions for alcoholism treatment in 1976. The number of admissions by treatment sources is shown below.

NIAAA Funded Projects	337,000
Private Physicians	305,000
Mental Health Facilities	260,000
Veterans' Administration Hospitals	97,000
Department of Defense Facilities	40,000
Halfway Houses	36,000
Department of Transportation (Driving-While-Intoxicated) Programs	28,000
	1.1 million

In addition, it was estimated that in 1976 there were 320,000 admissions to Alcoholics Anonymous programs and 481,000 to short-stay hospitals.

The growth of treatment resources over the past decade is illustrated dramatically in the increase in occupational or industrial rehabilitation programs (see Chapter X, Occupational Alcoholism Programing), halfway houses, and programs funded by NIAAA. National surveys have shown that the number of halfway houses has grown from 40 in 1963 to more than 750 in 1976. In addition to providing transitional support to the alcoholic moving from inpatient care back to the community, halfway houses provide more cost-effective care than institutions. Since 1971 NIAAA has provided direct funding assistance to more than 850 treatment programs that have served more than 1 million clients. By 1976, 330,000 clients had been served in 554 treatment programs, representing a wide variety of treatment settings and modalities.

Although substantial numbers of treatment resources exist, several problems must be resolved. Most people with alcohol-related problems do not receive treatment for them. Various aspects of the barriers to treatment are discussed in this chapter, as well as in chapter II; issues surrounding the financing of treatment are presented in chapter XI. Greater understanding is needed of the mixture of services necessary to provide the most effective and efficient treatment to the largest number of people.

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Barriers to Treatment

There may be several major reasons why only a small proportion—approximately 10 percent—of the Nation's 10 million problem drinkers (including alcoholics) receive treatment each year. A number of psychological, sociological, and economic factors interfere with the utilization of treatment opportunities. Examples of such barriers include social stigma, psychological resistance by both clients and therapists, and real or perceived inadequacies of the service delivery systems. As discussed in chapter II, these issues are particularly pertinent for such populations as women, youth, and other special populations.

Social Stigma

Although an increasing share of the American population regards alcoholism as an illness, many regard it as a moral weakness associated with some stigma. One national survey showed that while 60 percent of the respondents thought that alcoholism is an illness, 65 percent responded that it is "basically" or "partially" true that alcoholism is a sign of moral weakness.

In another study of the general population, 41 percent of the respondents agreed that "to be known as an alcoholic would destroy a man's reputation"; 45 percent believed treatment should be administered away from one's neighborhood to assure privacy; and 38 percent felt they would not be treated respectfully if they went to an alcoholism program. If these fears are shared by alcoholics, they could deter some from seeking treatment. The relatively recent self-disclosure of prominent public figures as recovering alcoholics may prove to be a significant event in overcoming the barrier of social stigma.

Denial of Alcoholism

Denial refers to an individual's difficulty in admitting that he or she may have problems with alcohol.

According to data from one study, denial often depends on the type of drinking-related problems reported by the respondents. External consequences of alcoholism such as poor job performance, marital troubles, arrests, and excessive drinking are rationalized easily. However, more personal consequences, including illness, injury, or loss of control, more readily indicate alcoholism to the person affected. Another finding is that refusal to be treated sometimes may reflect a reluctance to engage in treatment rather than denial.

Several stages, or factors, seem to be important in an individual's decision to seek medical care. For example, one researcher has described five factors necessary before a person will seek medical care: (1) a personal crisis must emerge to cause the patient to dwell on symptoms; (2) the symptoms must begin to threaten a valued social activity; (3) other people must begin telling him or her to seek care; (4) the consequences of not seeking help must be perceived; and (5) the pain, severity, and duration of symptoms must be sufficient to produce action.

These factors seem to affect various social and ethnic groups in different ways; lower income groups are much slower to react than higher income groups. According to this theory, an alcoholic's denial will not be changed until he or she experiences these "triggers" to action.

However, denial vacillates. The drive for recovery may be strong when the pain of a severe hangover is experienced, for instance, but may disappear later. This fluctuation is one of the frustrating problems in motivating alcoholics to seek and continue treatment.

Many treatment methods attempt to capitalize on the "pain stage," whether physical, mental, emotional, or social. As examples, one tenet of Alcoholics Anonymous is that an alcoholic must "hit bottom" before truly wanting help, and pain sometimes is used as a negative reinforcer in aversion therapy. In contrast, "court-mandated" treatment supports the principle that forced treatment is better than none and that the involuntary aspect only intensifies the client's normal resistance to change, which can be resolved early in therapy.

Failure and Reluctance to Diagnose and Treat Alcoholism

Although in the past 10 years hospitals have become more willing to accept alcoholic patients, alcoholism as an illness often is ignored while a more acceptable symptom or illness is treated.

Many professionals are pessimistic about treating alcoholism successfully and may avoid the label of alcoholism for fear of losing the patient's cooperation. The health worker too often readily accepts the alcoholic's denial. Training programs for professionals should focus on alcoholism as a health problem, teach tech-

niques of successful treatment, instill optimism about treatment outcome, and provide trainees with more exposure to alcoholism.

Referral and Service Delivery Failures

If referral to an appropriate treatment program is not managed correctly, an individual is likely to leave without obtaining care. Early dropout rates from alcoholism treatment are very high. Disdain, indifference, or delayed scheduling by the referral or treatment staff may be discouraging. In contrast, a staff member making a referral to Alcoholics Anonymous, for example, might contact a sponsor to escort the alcoholic to the first meeting.

Since one of the concomitants of alcoholism is a low tolerance for frustration and delay, a complicated admission and screening system can be discouraging. Discrepancies between the treatment program and the alcoholic's expectations also can increase the dropout rate. For example, psychotherapy may not be suitable for an alcoholic of lower socioeconomic status, given the patient's expectations of a physical examination, medicine, and environmental support. Ideally, if several treatment techniques were available, the alcoholic could have some choice in his or her treatment.

Treatment Barriers in Special Populations

Subgroups in the alcoholic population often require treatment programs tailored specifically for them. Barriers to the treatment of the Spanish-speaking, American Indians, women, the aged, and black Americans arise from the mores of the culture, language problems, or from societal attitudes toward the group. In the past, professionals have failed to recognize that alcoholic members of these groups have special problems and needs.

For example, Mexican Americans are reluctant to enter treatment and evidence a mistrust of Anglo authorities. Although exclusively Indian A.A. groups have been effective, it has been reported that American Indians are uncomfortable with the approach to Alcoholics Anonymous adopted by the dominant white culture. Many Indians feel they have encountered a lack of understanding and discriminatory attitudes at treatment centers managed by whites. Given societal norms and role expectations, women alcoholics face particularly heavy social stigma that may discourage them from seeking treatment. Existing treatment programs often do not consider their special needs. Elderly alcoholics frequently are difficult to find because relatives may discourage treatment.

In addition to expanded outreach programs to find alcoholics in these groups, therapies and programs designed to address their separate needs are important to breaking the barriers to treatment. These issues are discussed in detail in Chapter II, Special Population Groups.

Summary

- A major ideological issue within the field involves abstinence versus controlled drinking. Efforts are being made to gather valid data for differentiating those clients for whom the one goal is more appropriate, feasible, or desirable than the other. NIAAA, however, continues to endorse abstinence as the most appropriate treatment goal for alcoholism. While change in drinking behavior remains the primary goal of most treatment programs, increasing attention is directed toward psychological, social, and vocational criteria.

- Changes in treatment have occurred more as shifts in emphasis than as new discoveries. Pharmacological agents are advocated and used during various stages of treatment including detoxification, sensitization against alcohol, and postdetoxification long-term treatment. However, there has been a shortage of research and evaluation oriented toward these agents resulting in a lack of conclusive evidence regarding their efficacy. The trend in behavioral approaches is away from development of theory in favor of comprehensive, eclectic treatment plans based on observation of specific drinking behavior. Variations of the general approach now include aversion, assertiveness, relaxation-meditation, and biofeedback training.

- The historical concern for the most desirable mixture of client populations now centers on the pros and cons of treating alcoholics and drug addicts together or separately. Although evidence to date is meager, the combined

treatment of these groups appears feasible. Its general effectiveness is yet undetermined.

- Systematic, well-designed studies of treatment effects are rare, particularly those that have used random assignment of subjects to control and experimental conditions. Few differences in effectiveness among treatment settings, types, and duration have been identified. The patients' characteristics and motivation may be the essential factors in the recovery process.

- Although many treatment resources exist, most people with alcohol-related problems do not receive treatment for them. Practitioners in the field of alcoholism and alcohol abuse have become increasingly aware of overt and covert barriers to treatment. While social stigma continues as a major deterrent to treatment, clients resist treatment for many reasons. Further problems arise from inadequacies of the treatment delivery system. Underlying attitudes of blame, pessimism, racism, and sexism among traditional treatment personnel help perpetuate the numbers of alcoholics treated ineffectively.

- Recent evidence shows that resolution of alcoholism and problem drinking can occur in some people without formal treatment. However, the individual's commitment may not be sufficient to accomplish this without other conditions such as the availability of nonalcohol-related leisure activities, reinforcement from friends and family, and relative economic stability.

Chapter X.

Occupational Alcoholism Programing

Evidence from epidemiologic research indicates that chronic, damaging drinking occurs throughout American society, and that the greatest amount occurs among employed persons and their families. Therefore, a major theme of the alcoholism movement during the 1970's has been the development of mechanisms to reach persons at all levels of society with alcohol problems and to identify developing problems as early as possible. Occupational alcoholism programing, central to this theme, has been expanded steadily since the First and Second Special Reports on Alcohol and Health.

Goals and Structure of Occupational Programs

Several interrelated goals are at the core of most occupational programing efforts. The programs aim to reach employed problem drinkers in order to reduce the cost of poor performance and absenteeism associated with their drinking. They provide mechanisms for minimizing grievances and arbitration associated with employee alcohol problems that are costly for both labor and management. They also provide a means for recovering both the health and effective job performance of valued employees, and some even emphasize health considerations considerably beyond alcohol-related problems, providing assistance for both employees and families. Finally, as has been demonstrated by ongoing program results, early intervention into job-related alcohol problems can result in substantial rehabilitation.

Occupational programs in work organizations characteristically focus on developing systems that enable a maximum number of problem drinking employees to return to health and to adequate work-performance levels. These systems are based on the assumptions that (1) the most clearcut mechanism for identifying problems related to alcohol use is the supervisor's awareness of impaired performance; (2) alcoholism should be regarded as a medical problem in the workplace; (3) regular disciplinary procedures for poor performance should be suspended while an employee conscientiously seeks assistance for his or her problem; and (4) return to adequate job performance is the sole criterion for judging successful outcome.

These assumptions form the basis of programs which usually include the following components: a written policy and procedures statement; explicit labor-management cooperation in program development and operation; designation of key organizational personnel to channel employees for appropriate diagnostic judgment; orientation of supervisors and shop stewards about their responsibilities under the policy; diffusion of information about the program to the entire workforce; health insurance coverage for the treatment of alcoholism and related disorders; and assurance of total confidentiality for those identified and referred through the program.

Aside from these formal elements, several program ingredients are considered essential for success. For example, supervisors are discouraged from confronting an employee with evidence of alcohol use, but are instead restricted to identifying inadequate performance and then documenting it. In addition, the confrontation should involve both supervisor and steward, and should include an offer of assistance that makes it the employee's responsibility to return job performance to an adequate level. Finally, diagnostic decisions may be made only by a qualified professional, usually from outside the organization, and supportive followup must be provided to each individual during the period in which he or she is trying to cope with his or her problem.

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Because employers and unions make the decision to adopt programs and are then responsible for supporting their operation, there are no mandates governing the structure, functioning, or breadth of individual programs. Yet in the establishment of these programs, management and labor have been brought together in a process that parallels the principles of sound management for the benefit of their employees and union members.

History of Occupational Alcoholism Programing

As noted in the Second Special Report on Alcohol and Health, individual companies initiated occupational alcoholism programs as early as the 1940's, but the number of companies with formal programs grew slowly through the 1950's and 1960's. By 1973 an estimated 500 programs existed compared to the 50 operating in 1950. Due to national attention focused on the problem, nearly 2,400 organizations had some form of occupational alcoholism programs by mid-1977. Of these, approximately 2,000 were in the private sector and approximately 400 were in the public sector.

With just a few structural differences, early occupational alcoholism programing concepts for the most part were similar to those of today. First, most earlier programs were directed by company medical personnel, whereas today, personnel/industrial relations/employee benefits divisions often have the responsibility. Second, earlier programs tended to emphasize Alcoholics Anonymous as the primary referral outlet. Third, they placed little emphasis on the role of unions in program operation, a role that is regarded as essential today.

Aside from these differences, almost all programs to date have developed in similar ways. The National Council on Alcoholism was active at both the national and local levels during the 1960's, but it was not until 1972 that a large-scale nationwide effort at program diffusion was undertaken through activities implemented by NIAAA.

Two sets of grants were awarded by NIAAA in 1972, one to support demonstration projects to test models of delivering treatment services to employed populations, and the second to support a nationwide network of occupational program consultants (OPC's). This effort was part of a planned attempt to create and shape a new occupational specialty within the alcoholism movement.

Under the second program, all States and territories were offered 3-year grants of $50,000 per year for the support of two OPC's to be selected locally, one of whom was to provide programing services to public employers and the other to private ones. These individuals were to enhance management and labor awareness about occupational programing in their States, encourage the adoption of occupational programs, and provide technical assistance in program development.

Expansion of Program Concepts

The efforts funded by these grant programs have led to several substantial expansions in occupational programing concepts. First, there is the sharply increased emphasis on supervisors' identification of impaired job performance as the key to successful referral and rehabilitation of subordinates. While earlier programs had included this element, symptoms related to alcohol use also were cited as important cues. As noted previously, management now is admonished specifically against using these signs of alcohol abuse because they can be ambiguous. The current mode of identification even carries a beneficial side effect: it often results in pinpointing other personal problems among the workforce, and offers the employee appropriate assistance for a range of difficulties affecting job performance.

The second expansion is the current focus on the need for programing in public sector organizations, practically none of which had a program prior to 1972. This was accomplished in part by the State OPC's and further facilitated by a congressional mandate that the Federal Government establish an employee alcoholism program for its civilian employees. Later legislation required the same coverage for military personnel. Successful experience in a variety of settings within the public sector during the past 5 years has led to the recognition that these programs can be implemented under many conditions. Public-sector programing presents some unique challenges, created by such situations as the intense protection of employees against disciplinary measures under Civil Service codes.

The third expansion of occupational programing involves explicitly and deliberately

including labor unions as cooperating partners with management in some instances and as initiators in others. Since the programs have positive aims in terms of employee welfare, organized labor would seem to be a natural source of support for these efforts. Some labor leadership has, however, been cautious about supporting the programs fearing that employee rights might be violated, although many of these concerns have been allayed through labor's active participation in the effort.

In addition to these direct activities, NIAAA also disseminated information about occupational programing through various media and played a major role in the formation of a national association of occupational programing specialists. While NIAAA has not provided principal leadership and direction in the field, it has been a major facilitator for the relatively rapid growth of this new specialty. Current leadership and direction in occupational alcoholism are largely indigenous to the field; accordingly there is no single measure to describe the degree to which occupational programers are accomplishing their goals. The cumulative results of several indexes do, nonetheless, point toward substantial progress while highlighting areas where concerted efforts are needed.

Program development in the private sector was evaluated in 1972, 1974, and 1976 by Opinion Research Survey, Inc., through Executive Caravan surveys of a sample of "Fortune 500" companies. The proportion of sampled companies reporting the existence of some type of program "designed to identify and provide assistance to problem drinking employees" climbed from 25 percent in 1972, to 34 percent in 1974, and to 50 percent in 1976. While the data also indicate that many of these programs probably need substantial upgrading, there is also strong evidence of executive involvement and support for them. In fact, 72 percent of executives included in the 1976 survey believed their companies saved money by having the programs. Further, a positive assessment of their programs' overall effectiveness was nearly universal among executives in this survey.

In addition, management support for existing programs has increased since 1972, and no reports of union resistance to programing efforts were noted. Further, the data show that of respondents in companies without programs, fully half indicated receptivity to the idea of a program's being developed in their organization.

A study of the development of the Federal Employee Alcoholism Program involved collection of detailed information from a sample of civilian installations in the Northeast. While the study identified numerous sources of resistance to policy implementation, the researchers concluded that the policy was in the process of becoming a program as of 1974. They also noted that fully 11 percent of the supervisors and managers in their sample reported they had made use of the policy. A more recent survey conducted by the General Accounting Office concurs with the conclusion that, while progress toward implementation has been made within the Federal Government, more work is necessary.

Another indication of progress in public sector programing is found in a 1976 survey in which 34 States reported the existence of a partially or fully implemented State employee alcoholism program.

Specific Evaluation Studies

Several studies that focus on the operation of specific programs have been reported recently. An evaluative study conducted for the Navy revealed that its treatment program based on an occupational identification model was substantially cost effective. The researchers suggested that these savings could be enhanced further by efforts at earlier identification.

A research project that involved data collection from 15 private organizations with alcoholism programs underlined the positive impact of the programs on their clients. A second phase of this study indicated that employers' investments in such programs would result in cost savings. A survey of alcohol and drug abuse programs in the railroad industry likewise indicated rehabilitation rates averaging 69 percent of referrals across the programs surveyed.

Finally, a survey in which respondents who were representatives of nearly 400 organizations that received occupational services from NIAAA-funded demonstration projects indicated that 85 percent of the organizations had referred at least one employee for assistance during the previous 12 months. Overall, the organizational representatives were strongly satisfied with the assistance they had received from the occupational programing specialists.

Data from the range of NIAAA-funded treatment programs tend to indicate progress.

Compared to those referred through other types of mechanisms, the earlier identification of problems through occupational programs is indicated by the fact that clients are younger, most likely to be entering alcoholism treatment for the first time, and less impaired at intake. Still, it appears that early identification efforts can be further enhanced, since the mean age of occupationally referred clients is still more than 40 years. Furthermore, the proportion of female clients referred should be increased from the 1976 level of 14 percent.

There are no known reports of employee programs that have had either damaging impact or poor outcomes with the referrals that have been generated. In order to assess the situation fairly, it is necessary to point out that while these studies show substantial success—an estimated 70 percent of referrals—they rarely mention the 30 percent of referrals who fail. Second, the published literature does not yet detail the nature of organizations within which program development has been initiated and has failed, or where an established program is relatively ineffective at generating referrals.

Support for Occupational Programing Systems

There is no doubt that the climate for occupational programing has changed substantially since 1972, when there was a lack of information about occupational programs among both leaders in the business and governmental communities and alcoholism specialists. This situation did not necessarily indicate resistance to the concepts. In fact, one-quarter of the Fortune 500 representatives interviewed in the 1972 Executive Caravan Survey indicated the presence of at least a rudimentary program for problem drinkers employed in their organization. It appears, however, that the initial cohort of OPC's adopted a rather strong sales approach in dealing with these executives in which the cost savings of programing were strongly emphasized. This approach appeared in many instances to ignore the basic receptivity of many executives toward providing assistance to employees whose job performance was being adversely affected by personal problems.

Eventually recognition of these employer attitudes began to result in a corps of OPC's who saw themselves as agents of change. They began to perceive that program adoption and support would take place in a context of voluntarism where the change agent must help determine an organization's needs, priorities, and resources. It appears that OPC's will be used increasingly as consultants by business leaders to establish or improve their occupational programs.

As the climate for occupational programing has altered, an atmosphere of trust, support, and cooperation has developed between occupational programers and the larger community of alcoholism specialists. OPC's realize that they must promote adoption of occupational programing concepts among their colleagues as well as among their organizational clients. Evidence that the clients in occupational programs have better prognoses than clients in other treatment programs has been a major factor in gathering support for occupational programing within the alcoholism community. Occupational programs may indirectly improve the quality of treatment services in the community as well, both through making available third-party payments and by bringing the attention of business leaders to bear upon the quality of services available in the community.

State occupational programing systems now are found in all but one State, and 31 included formal plans for these programs in the most recent State alcoholism plans. These systems are of three general types. Approximately one-fifth of the States followed the pattern originally prescribed in the 1972 NIAAA grant, with one or more OPC's providing statewide coverage in delivering programing services. In another fifth, statewide services are provided by OPC's whose activities are directed locally and without central State coordination. The remaining three-fifths of the States have some combination of State and local OPC's, with State-based personnel providing varying degrees of coordination and technical assistance to personnel at the local level. These systems are relatively intact and stable in about two-thirds of the States, while in the remaining third funding uncertainties and weak coordination render the systems somewhat less than stable.

Emergence of local OPC's has been a major innovation which has, on the one hand, enhanced statewide coverage, provided continuity of the system to local work organizations, and sustained the local visibility of occupational programing. On the other hand, dispersing of occupational programing responsibilities to personnel who are

primarily part time raises strong concerns about quality control over service delivery. Further, one study has found that OPC's have made little progress in developing viable programing strategies for smaller work organizations. Also, ratings on various scales indicated that, as a group, OPC's have not yet achieved professionalism.

Another important development in the effort to gain support for the movement is the emergence and growth of an association for occupational programing specialists—the Association of Labor and Management Administrators and Consultants on Alcoholism (ALMACA). Founded in 1971, it now has 1,200 members with a wide array of occupational programing interests. The organization is expanding rapidly, adding local chapters, most of which meet monthly.

There are two other organizations, the Occupational Program Consultants Association and the International Occupational Program Association, that serve specialized occupational programers. The memberships of all three are largely overlapping.

Improving Occupational Programing

While the paucity of research data constitutes a major problem currently facing occupational programers, several studies have been published that suggest ways to improve programing at several levels of implementation and draw attention to some previously neglected problems.

In examining how executive decisionmakers in major private companies can be encouraged to adopt programs, the 1976 Executive Caravan Survey included comparisons of executives in companies without programs who were receptive to developing a program with those who were not. The findings suggest that it would be more effective to focus on available procedures to address a potential problem than to counter the executives' perceptions of the prevalence of alcohol-related problems.

A similar suggestion regarding program implementation in governmental organizations comes from the previously mentioned study of the Federal employee alcoholism policy. Here, lack of familiarity with the policy was associated with underutilization of the available resources. This study of implementation also suggests that supervisors who are somewhat alienated and are only minimally involved in their jobs were less predisposed to use the program. The data also point to the tendency in some public sector organizations to spread the information about the policy, but then not use it. Alcoholism coordinators were found to be more effective if they were in line rather than staff positions, and their success improved sharply if they were provided with assistance in implementing the program.

The absence of a union was associated with low supervisory use in these public-sector organizations. In organizations that were unionized, union leadership expressed strong interest in being involved in policy development, and management's awareness of the union's position increased policy use. The study also indicated that policy implementation was least likely where the administration was characterized by many formal rules and where power was concentrated in upper organizational levels.

Another study examined the structural characteristics of jobs held by persons subsequently identified as having alcohol problems. The hypothesis that these characteristics prevented identification was not supported, and instead, job changes and turnover were found to be more related to age and drinking behavior. In a different study, however, two work conditions were positively associated with identification of problem drinking employees: interdependence of jobs and mobility from a base office. These studies point indirectly toward job-based factors which are conducive to alcohol use problems. Finally, the 1976 Executive Caravan Survey showed increased rates of heavier drinking among executives in private corporations, and pointed to the potential impact of drinking on responsible decisionmaking.

Major Problems of Occupational Alcoholism Programing

While the field of occupational alcoholism has undergone considerable growth during the 1970's, the movement is not without its problems. First, the basic programing model that stresses supervisory confrontation on the basis of deteriorating performance is not appropriate for a number of occupational and professional groups. Included are executives, most professionals, those who work in isolated settings, and small businesses that do not have a formal supervisor. However, data have been gathered from demonstration projects involving a university faculty and a group of commercial airline pilots, and

ideas on intervention strategies designed for lawyers, physicians, and priests are being accumulated. The need to reach upper echelon personnel in both public and private organizations currently stands out as particularly problematic, especially in light of reported drinking behavior among members of these groups.

Second, the voluntary nature of occupational programing in private sector organizations, and to some extent in public ones, presents problems in formulating the definition of a "program," which makes it difficult to define benchmarks for this new field. Recent data indicate that some efforts that may be perceived as "programs" by decisionmakers would not be so considered by CPC's. An incomplete or partial program in an organization actually may be worse than no action at all.

Third, although the community of occupational alcoholism program specialists has grown substantially, the field is not yet recognized as a substantial occupation or profession. The absence of training opportunities for occupational specialists does not enable them to establish credentials, which in turn creates difficulties in interacting with other sectors of the alcoholism community where concerns about credentialing are strong. The field further lacks an ongoing set of channels to develop and enhance a professional reputation, although ALMACA is a vigorous organization that appears to be meeting many of these needs. Finally, the research base on which work in the field proceeds is incomplete in nearly all respects, and specific research planning and recruitment of additional researchers must be completed before the desired status is achieved.

A fourth problem area is research and evaluation. Since the focus of occupational alcoholism is the program, which is adopted and maintained on a voluntary basis, there are no assured routes of research access. Furthermore, even under the best of conditions, the need for confidentiality may preclude addressing many crucial research issues. These problems are may preclude addressing many crucial research issues. These problems are not insurmountable, but the difficulties of data access have complicated nearly every research effort of any scope in the field.

A fifth problem involves general support for occupational alcoholism programs. While considerable savings of both lives and dollars have resulted, as yet there is no special interest group concerned about the general welfare of the movement. Should an active constituency comprised of leaders of both labor and management develop nationally, the problems outlined here might be solved.

Summary

- Occupational alcoholism programs as a mechanism for early identification and intervention of alcoholic employees are receiving ever-increasing acceptance. Program concepts have expanded and the role of the alcoholism specialist known as the Occupational Program Consultant is shifting from that of a promoter or seller to one more similar to consultant in the business world.

- Between 1950 and 1973, the number of occupational alcoholism programs expanded from around 50 to an estimated 500. By mid-1977, however, the number of organizations with some type of program had increased to nearly 2,400 with approximately 2,000 in the private sector and 400 in public sector agencies and organizations.

- Earlier occupational programs were placed primarily in medical departments, whereas the present trend is toward placement in personnel/industrial relations/employee benefits divisions.

- Increased emphasis is being placed by programing specialists and organized labor on the role of the union in the development and implementation of company programs.

- There is also increased emphasis on the role of the supervisor in noting and confronting employees with impaired performance, although diagnosis of alcoholism is made by a qualified professional.

- A substantial majority—72 per cent—of executives among "Fortune 500" companies with occupational programs believe that their organizations have saved money as a result of their companies' programs. A positive assessment of program effectiveness in overcoming job impairment due to alcohol use was almost universal among this group.

- A variety of studies indicates that occupational programing has the potential of even greater effectiveness, while evaluation of present efforts reveals areas of activity in which program outcomes may be enhanced even further.

- A number of groups and organizations have not been involved in occupational programs. These include small business, executives and similar upper echelon personnel, most professionals, and persons working in isolated occupational settings.

Chapter XI.

Financing Alcoholism Treatment Services

The magnitude of the alcohol problem in this country and the economic costs to society of alcohol-related problems have been discussed in chapter I of this report. It has been noted that health care costs directly attributable to alcohol-related problems are an estimated 12.1 percent of U.S. national health expenditures. There is a significant opportunity for reducing health care expenditures if effective alcoholism treatment services are supported. Recognition of this opportunity has led to funding by Federal, State, and local governments, as well as to modifying health insurance policies to cover alcoholism services. This chapter discusses these and other funding sources that currently are being used to finance alcoholism treatment services.

Governmental Support

Since its inception in 1970, the National Institute on Alcohol Abuse and Alcoholism has been helping to establish alcoholism programs by funding service projects directly and by making Federal formula grants available to States. An added source of Federal moneys became available from NIAAA in 1974 when incentive grants to the States were authorized to encourage the adoption of the Uniform Alcoholism Treatment and Intoxication Act. In addition, Federal support from other agencies (table 1) totaled approximately $207 million in 1976.

Table 1. Federal Agency Alcoholism Obligations for Treatment Services

Treatment and Rehabilitation	1976 Actual (Thousands of Dollars)
DHEW:	
ADAMHA (NIAAA)	$ 93,616
Human Development	32,414
Subtotal	$126,030
HUD	$ 2,693
Department of Defense	14,109
Veterans Administration	62,286
Department of Transportation	253
Department of Justice	291
Other	925
Total Treatment and Rehabilitation	$206,587

The financial base at the local level has expanded as States and other local governments either matched Federal funds or appropriated other sources of support. Federal, State, and local administrators consequently have sought to determine what resources are available for

alcoholism programs and to identify what services these moneys are buying. This information is compiled in NIAAA's State Alcoholism Profile Information System (SAPIS), developed to discover the impact of formula grants within the States. According to a 1977 SAPIS report of 43 States providing information, average financial sources were formula grants, 13 percent; other NIAAA funds, 17 percent; local sources, 17 percent; and State and other Federal funds, 53 percent. An average of $7,322,000 per State was available to the States in FY 1976.

Information about resources undoubtedly will be improved by the SAPIS program, the impact of 1976 legislation requiring an accounting of States' public and private alcoholism service facilities in formula grant applications, and a recent NIAAA initiative to compile an annual report on all Federal activities related to alcohol problems.

Whatever the precise level of public funding of treatment services may be, nonpublic support clearly is required if adequate treatment resources are to be made available. Therefore, the extent of health insurance coverage for alcoholism treatment is of great concern. To illustrate the situation, table 2 shows the amount of insurance coverage of clients of selected NIAAA programs in 1976. The proportion of individuals with health insurance at all and with alcoholism coverage in particular varies widely with the type of program. Health insurance coverage varies from 21 to 85 percent and alcoholism coverage from 10 to 45 percent. The proportion of individuals with health insurance who also have alcoholism coverage ranges from 18 percent to 53 percent.

Health Insurance

Health insurance has been made available specifically for alcoholism only within the last decade. In the past, alcoholism was a hidden illness, and treatment usually took place in a State-supported institution because care in the private sector was either unavailable or prohibitively expensive. Little is known about the nature or extent of insurance coverage for alcoholism before the mid-1960's. However, it is safe to assume that many alcoholics received treatment under the mental health benefits of their insurance policies.

By the late 1960's it became clear that insurance carriers and providers were applying obvious sanctions to the treatment of alcoholics. Hospitals frequently blocked the admission of alcoholics, and health insurance policies limited coverage in many ways. With the dramatic surge of health care costs in this era and the increased recognition of the extent of alcoholism and alcohol abuse, the need to establish effective private third-party payment mechanisms was clear. NIAAA worked with representatives of health agencies and insurance carriers to study the status of alcoholism insurance coverage, to identify barriers to improved coverage, and to develop model benefit provisions.

Private Sector Plans

The private sector has three major components: Blue Cross-Blue Shield plans, commercial insurance companies, and independent plans. Blue Cross-Blue Shield is a confederation of two private nonprofit corporations. Commercial companies include life and casualty insurance companies as well as other companies that provide health coverage. Finally, independent plans include employer- or employee-sponsored programs, health maintenance organizations, private group clinics, and dental service corporations.

Blue Cross-Blue Shield

An estimated 84 million subscribers are covered by the approximately 70 Blue Cross and Blue Shield associations operating in the United States and Puerto Rico. In 1976, the Blue Cross Association (BCA) and NIAAA initiated a nationwide study to determine the feasibility of offering comprehensive benefits for alcoholism treatment throughout the Blue Cross health insurance system. The study has produced a series of technical assistance documents designed to address the essential components needed in comprehensive alcoholism coverage. They were (1) a marketing package, including the benefit structure, a defined target population, rates, and a subscriber education program; (2) an administrative segment covering contracts with health care providers, legal constraints, and control of benefit utilization; (3) a guideline for test-site selection; and (4) a program for evaluating test-site results.

Some individual Blue Cross plans are offering increasingly comprehensive alcoholism benefits. In 1974, for instance, Capital Blue Cross in

Table 2. Health Insurance Reports by Clients of Selected NIAAA Programs (1976)

	Alcoholism Treatment Programs (%)	Public Inebriate Programs (%)	Occupational Programs (%)	Problem Drinking Driver Programs (%)	Cross Population Programs (%)
Clients with Health Insurance	48.0	21.0	85.0	56.0	48.0
Health Insurance Covers Alcoholism	18.0	10.0	45.0	10.0	18.0
Medicare	2.3	1.6	0.2	0.5	1.6
Medicaid	3.9	4.5	1.5	0.7	5.3
Blue Cross/Blue Shield	4.8	1.8	22.8	3.7	5.6
Private Insurance	3.7	1.3	11.6	2.2	3.1
Other	3.6	1.2	9.2	2.8	3.0
No. of Projects Reporting	39	20	14	19	47

SOURCE: Data from O. C. Jones, D. T. Kay, and B. B. Silber, *Implementation of the State Alcoholism Profile Information System (SAPIS)*. Final report prepared for National Institute for Alcohol Abuse and Acoholism under Contract No. AOM 281-76-0003. 1977.

Pennsylvania introduced an alcoholism benefit that provided rehabilitation treatment immediately following detoxification in institutions specializing in alcoholism treatment. Premiums were not increased for this benefit because the plan's administrators realized that alcoholism treatment previously had been paid for under other diagnoses. Current data indicate that the benefit will reduce the number of claims and the total costs incurred by the carrier.

Blue Cross of Maryland provides alcoholism treatment benefits through one program in residential nonhospital settings and through another in outpatient care. Substance-abuse benefits—including alcohol and other drugs—were made available to the approximately 1 million members of the United Auto Workers Union, their spouses, and dependent children by Blue Cross and Blue Shield of Michigan.

Commercial Carriers

The trend among major commercial carriers is toward offering coverage for alcoholism treatment. The percentage of policies specifying exclusions or limitations on alcoholism coverage dropped from 16.5 percent in 1972 to 13 percent in 1975, according to one survey.

Independent Plans

Health Maintenance Organizations (HMO's). HMO's provide basic and supplemental health care on a prepaid basis to their membership. To qualify for Federal subsidies, an HMO must offer medical treatment and referral services for alcohol or other drug abuse. The Group Health Association of America, a national voluntary organization of group health plans, initiated an alcoholism treatment feasibility project to test the potential of comprehensive alcoholism treatment services in prepaid group practice plans. Although the data are too limited to be conclusive, indications are that there is a reduction in total health care use when alcoholism is identified and treated appropriately.

The Harvard Community Health Plan. This plan in Cambridge, Mass., which includes both inpatient and outpatient alcoholism benefits, reported a monthly cost for alcoholism treatment of only $0.05 per member. During the first year, no client used the inpatient treatment beyond the benefits provided.

Employee Benefit Plans. The industries sponsoring occupational alcoholism programs usually have policies that cover inpatient services, according to one survey. Considerably less coverage was provided for outpatient treatment.

Unions and Health Insurance Plans. The Nation's labor unions have participated actively in encouraging health insurance coverage for treating alcoholism and other drug abuse. Unions affiliated with the AFL-CIO and major independent unions such as the United Auto Workers, the United Mine Workers, and the Teamsters are implementing and expanding alcoholism treatment benefits.

Public Sector Programs

Several health insurance assistance programs are provided by law under Federal or State auspices and are financed through taxes. Benefits, fixed by law, are available to those who qualify under the plan. These publicly supported programs include medicare, medicaid, CHAMPUS (Civilian Health and Medical Care Program for the Uniformed Services), the Veterans'

Administration program, and State temporary workers' compensation systems.

Medicare

Primarily, medicare pays medical expenses to individuals aged 65 or older who are entitled to retirement benefits under title II of the Social Security Act or under the Railroad Retirement System. Administered by the Social Security Administration, medicare's benefits and eligibility requirements are uniform for all participants and include hospital insurance and supplementary medical insurance for the aged and disabled. Medicare categorizes alcoholism and drug abuse treatment under psychiatric or mental health services, and the coverage is less than that available for physical illness.

Medicaid

Medicaid provides medical assistance to low-income individuals. Treatment cost is shared by the States and the Federal Government. A major limitation is that persons aged 21 to 64 cannot receive care in a psychiatric hospital under medicaid. In several States, however, medicaid plans provide reimbursement for treatment of problems associated with drug or alcohol abuse. Because services for alcohol or drug abuse problems are not mentioned in the medicaid statutes, the States determine whether treatment should be excluded or included.

A 1976 telephone survey revealed a wide range of practices. Most States reimburse for inpatient treatment of organic illnesses caused by or related to alcoholism, and 85 percent of the States reimburse for outpatient care for these illnesses. The proportion of States that reimburse for direct treatment of alcoholism is substantially lower. Approximately two-thirds reimburse for treatment at a community health center; nearly one-third pay for care at an alcoholism treatment center or from an alcoholism counselor; and about one-tenth absorb treatment costs at a halfway house or similar facility.

Title XVI

Under title XVI of the 1973 Social Security Act, supplemental security income (SSI) is granted by the Federal Government to those eligible for Aid to Families with Dependent Children, to the blind, to persons who are otherwise disabled, and to needy persons over the age of 65. The present social security law requires an alcoholic SSI recipient to designate a third party to receive his or her supplementary income. Often, this procedure undermines the self-confidence of recovering alcoholics. Pending legislation would enable the attending physician of the facility where an individual is undergoing treatment to certify that direct payment of SSI benefits to the patient would be beneficial. The costs of alcoholism treatment generally are not covered by the SSI program.

Title XX

Title XX, a 1975 amendment to the Social Security Act, currently contributes $2.7 billion annually to the States for social services. The required State comprehensive plans may include alcoholism treatment services if they are defined explicitly. A 1976 analysis of services available for treatment of alcoholism and drug abuse under State title XX plans revealed that 10 States provide services specifically concerned with treatment of alcohol abuse; 11 pay for services related to both alcohol and drug abuse, and 16 reimburse for specific mental health services.

CHAMPUS and CHAMP-VA

This insurance program for dependents of military personnel covers inpatient and outpatient care for alcoholism. However, inpatient rehabilitative care beyond detoxification is limited to a lifetime maximum of three admissions, and outpatient treatment is limited to psychiatric services. A similar program, CHAMP-VA, is available to the dependents and survivors of some disabled veterans.

Disability Insurance

Public disability programs involving workers' compensation are available in all 50 States. Compensation is limited by 27 States if alcoholism or problem drinking is the cause of injury resulting in a claim.

Other Federal Involvement

National Health Insurance

In view of the tremendous health, social, and economic costs related to alcoholism, benefits for alcoholism and related health problems should be considered in the development of health insurance coverage. These should include a range of service components to assure a minimum level of continuity of care for alcoholism treatment.

A recent cost-benefit study of alcoholism treatment centers reinforces the argument for including coverage for alcoholism care in any health insurance package. The study found that the national economy will realize 10 years of benefits, estimated at close to $22 million, from the operation of 41 alcoholism treatment centers during the last half of 1974. However, half of the 20 legislative proposals for national health insurance introduced in the 94th Congress did not mention alcoholism specifically.

Civil Service Plan

The Federal Government offers 55 health insurance plans to its employees. Most of these include some benefits for alcoholism, although the extent of the coverage varies widely. Some plans have a specific alcoholism benefit, but most alcoholism treatment is part of the mental health benefits or some other benefit category.

NIAAA Activities

NIAAA has sponsored a range of studies to plan increased health insurance coverage for alcoholism treatment and has developed experimental projects to demonstrate the feasibility of this type of insurance. The agency helped to develop standards for treatment facilities that, when implemented, lead to accreditation. When a facility is accredited by the Joint Commission on Accreditation of Hospitals (JCAH), more carriers are willing to insure the care provided there. More than 200 alcoholism programs nationwide have been accredited by JCAH.

One of the agency's feasibility studies resulted in a model alcoholism treatment package designed to provide insurance companies with a basis for projecting a range of costs in various alcoholism treatment settings. The model benefit package recommends 6 days of inpatient emergency care, 14 days of inpatient care, 30 days of outpatient care, 30 days of short-term intermediate care, and 60 to 90 days of long-term intermediate care. This package was tested for 2 years in the California State Employees' Insurance Alcoholism Program.

NIAAA is concerned with State and local service programs in several administrative areas, including training, cost accounting systems, and policy procedures, and is working with others in the field to develop certification standards for alcoholism counselors.

State Involvement

State Regulatory Agencies

Since State insurance departments are empowered by statute to regulate the extent and cost of insurance contracts and the conduct of insurance carriers, State legislative actions have become important in setting minimum standards for alcoholism treatment. A mid-1976 survey of State legislative activities showed that insurance coverage for alcoholism treatment had increased considerably since 1974. Unfortunately, the enacted legislation often emphasizes inpatient care and limits outpatient treatment, although recently some States have mandated more extensive outpatient benefits. By mid-1977, 20 States had enacted legislation into law, and 11 other States had introduced legislation related to health insurance coverage for alcoholism (figure 1).

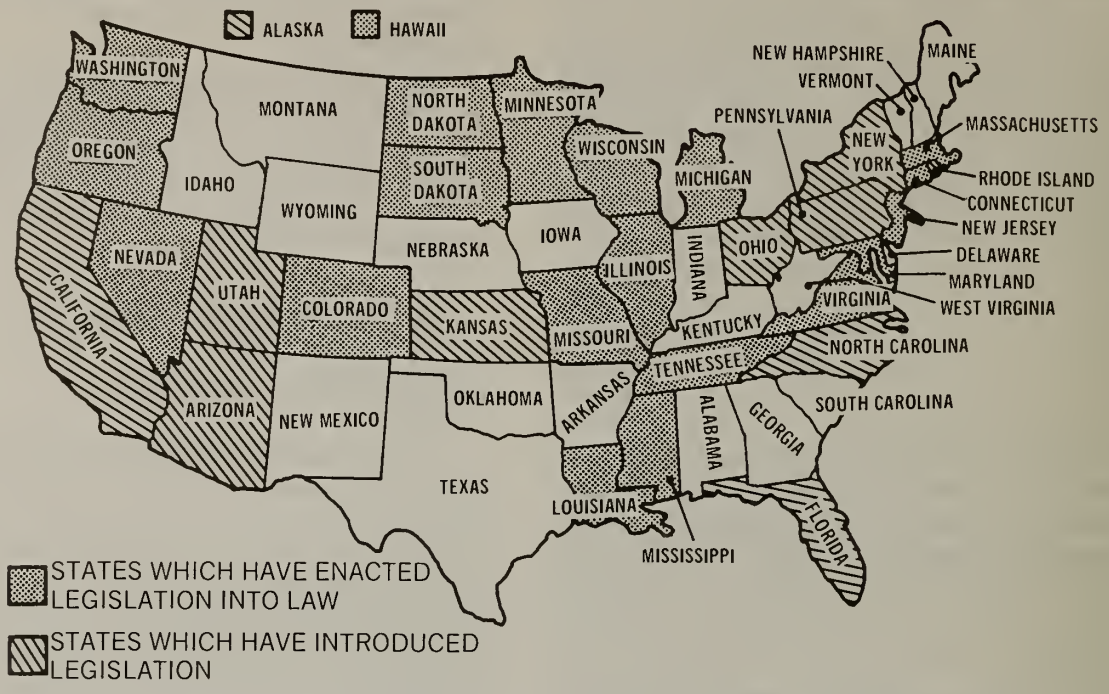
California State Employees' Insurance Alcoholism Program

This 2-year pilot alcoholism program was based on the model benefit package described briefly above and more extensively in the Second Special Report on Alcohol and Health. It offered benefits for 158,000 State employees and more than 300,000 family members, through nine insurance carriers. The program involved no risk for the various moneys paid for both alcoholism treatment claims and carrier administrative expenses.

The alcoholism benefit package provided

- inpatient care in a hospital or other licensed facility, including up to 6 days of detoxification services and 21 days of treatment a year;

Figure 1. State Legislative Activities Relating to Health Insurance Coverage for Alcoholism, 1971-77



SOURCE: Data from Jerome Hallan and Becky Hayward, Health insurance coverage for alcoholism: Current status. Unpublished report prepared for National Institute on Alcohol Abuse and Alcoholism under Contract No. ADM 281-76-0023. Raleigh: H-2, Inc. 1977.

- day or night residential care in a licensed recovery home for a maximum of 30 days annually; and

- outpatient care limited to 45 visits a year to a physician or to a licensed or certified professional or paraprofessional mental health worker.

For each of the 766 persons participating in the program, the average expenditure was approximately $600. Some 422 inpatient admissions were recorded at an average cost of $1,392. An estimated 540 persons each attended an average of nine outpatient sessions at an average cost of $17 a session. Outpatient care benefits represented approximately 16 percent of the total benefits paid. Recovery-home care was the least used service.

For one evaluation, data were collected on nonalcoholism health care for 2 years before treatment began and continued during treatment. Preliminary findings indicate that average monthly nonalcoholism treatment costs were reduced by approximately 25 percent after a person began treatment for alcoholism.

If the State of California had not paid for all costs of the pilot program, the additional average premium for each family enrolled in the State and public employees' program would have been only $2.05 a year, or $0.17 per month, to cover the cost of alcoholism treatment. However, these estimates are based on a relatively low utilization rate for the available services.

Summary

- Federal, State, and local government funds constitute a significant proportion of the resources for alcoholism treatment. If adequate treatment coverage is to be provided to alcoholics, a major increase in the share of this support must be provided by health insurance.

- Lack of third-party reimbursement has limited the number of service providers. Until recently, insurance carriers were reluctant to cover treatment of alcoholism, but the trend is changing. For example, in 1972 approximately 25 percent of all Blue Cross plans specifically excluded alcoholism. By 1976,

only 4 of 60 plans responding to a survey excluded alcoholism treatment.

- Although some private insurance carriers still exclude or limit alcoholism treatment, increasing numbers are providing coverage.

- Increasingly comprehensive alcoholism benefits are being offered by individual Blue Cross plans. Some offer alcoholism treatment in special inpatient centers and others provide innovative outpatient care. The United Auto Workers union Blue Cross coverage includes both residential and outpatient treatment.

- Many employee health insurance plans specifically include inpatient alcoholism treatment; far fewer cover outpatient treatment.

- State legislatures are concerned about the availability of insurance for alcoholism treatment. Twenty States have enacted legislation either mandating that alcoholism coverage be provided or requiring that it be available as an option.

- Preliminary findings from a California experimental project indicate that the average monthly nonalcoholism health care costs for both the alcoholic and the immediate family were reduced by 25 percent after the individual began treatment for alcoholism.

- Varied benefits are offered in the public sector. Current medicare provisions for alcoholism treatment to the aged and disabled are restrictive compared to benefits available for physical disease. Medicaid programs often ignore treatment for alcoholism. The Supplemental Security Income Program (title XVI of the Social Security Act) employs sanctions against the alcoholic who fails to stay in treatment. Alcoholism treatment is specifically provided for under the Social Services for Individuals and Families Program (title XX of the Social Security Act) in 10 States, and specific alcoholism services are reimbursed by 11 States.

Chapter XII.

The Prevention of Alcohol Problems

Out of the Shadow of Treatment

For as long as humans have known and enjoyed alcohol, they have recognized and sought to avoid the problems it can bring. The current interest in prevention is, in part, a recognition of the futility of trying to address alcohol problems solely by treating the casualties. Until recently, the search for insights into the prevention of alcohol-related problems was tied to the alcoholism treatment movement and the thinking of the temperance era. To understand prevention concepts and current policy fully, it is necessary to review the major tenets of the temperance movement and the treatment concepts that emerged from it.

The temperance movement pioneered the idea that alcohol problems could be seen as symptoms of a single underlying phenomenon, alcohol addiction. For the Prohibitionists, the addiction was inherent in the substance, alcohol. The post-Prohibitionist alcoholism movement maintained the alcohol addiction concept, but viewed the addiction as inherent in the individual who is both vulnerable and predisposed to alcoholism, rather than in the alcohol itself.

With acceptance of the idea that addiction was inherent in the individual, not the substance, alcoholism became a disorder to be addressed at a personal level. Therefore, the primary response to alcohol problems in recent times has been the creation of a treatment system oriented toward helping individual alcoholics recover from their addiction. In this context, prevention often has been disregarded completely or seen primarily as an effort to identify alcoholics early and to urge them to enter treatment. Until the last few years, little attention was paid to prevention methods that were not linked to alcoholism treatment.

Recent years have seen a considerable increase in interest in prevention programs and a growing recognition of the necessary differences of approach between prevention and treatment programs. Imaginative, realistic, and effective prevention programs are beginning to emerge.

Definition for Prevention Programs

Prevention programs should begin by defining the alcohol-related problems they seek to prevent. In today's society, the programs do not include prohibition as a goal; instead, they seek to minimize alcohol-related problems and to reduce the negative consequences of drinking. They recognize that most alcohol-related problems fall within five general areas:

- chronic illness or disability resulting from prolonged excessive drinking;
- acute health problems related to a specific drinking bout;
- injuries, death, and property loss caused by accidents and crimes related to drinking;
- failure of the chronic excessive drinker to fulfill his or her role in the family or on the job; and
- mental problems, such as depression and anxiety, related to drinking.

Once the mass of alcohol problems is broken down into distinct alcohol-related behaviors requiring modification, the approach to preventing those problems must be determined. According to public health principles, problems are seen as stemming from an interaction of three factors: the host, the agent, and the environment. Intervention at any or all of these points is appropriate for the prevention of a problem. In

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dealing with alcohol problems, the public health model becomes

Host	The individual and his or her knowledge about alcohol, the attitudes that influence drinking patterns, and the drinking behavior itself
Agent	Alcohol—its content, distribution, and availability
Environment	The setting or context in which drinking occurs and the community mores that influence the drinker.

Although strategies focusing on any of the three factors may overlap or complement work directed at the others, the public health model provides a useful framework for understanding and organizing prevention programs.

Changing Individual Drinking Behaviors—the Host

To date, much of the work in prevention programing has focused on the host or individual. Primary aims have included increasing knowledge about alcohol and its effects, modifying attitudes to support moderate drinking or abstention, increasing decisionmaking and interpersonal skills, building self-concepts, and modifying drinking behaviors.

Various programs have demonstrated progress in these areas on a short-term basis. Ways in which this has been accomplished have involved the provision of alternatives, alcohol education, mass media, and voluntary organizations.

Provision of Alternatives

Most prevention programs employ alternative activities and beverages to distract the participant from alcoholic beverages and to increase his or her self-esteem. These programs may emphasize the possibilities for recreation and socializing that often are overlooked in a drinking society. They should be evaluated carefully to determine their effectiveness in reaching ultimate program goals of reduced negative consequences of drinking, rather than simply the participants' enjoyment of alternative activities.

Alcohol Education

Alcohol education programs are perhaps the most visible of all prevention methods. Program goals have shifted gradually away from complete abstention to (1) promoting informed decisionmaking about drinking, (2) reducing deviant drinking, (3) focusing on values as guides to and influences on behavior—with or without specific reference to alcohol, and (4) improving psychological and social coping skills so that resorting to alcohol as a coping mechanism will be less likely. Alcohol education has included workshops, classes, special curriculums, and peer education programs.

Although the existing evaluative literature has not demonstrated its effectiveness, alcohol education generally is considered important in preventing alcohol-related problems. The belief in education as a solution to social problems is longstanding in the United States, and alcohol education programs undoubtedly will continue. Clearly, evaluation to assess long-term effects of alcohol education must be undertaken to help determine the future direction of educational approaches.

Mass Media

In the past few years, alcohol issues have received considerable attention on television, radio, and in print. Treatment-oriented strategies such as discussing alcoholism as a treatable illness, providing checklists of symptoms of alcoholism, and enhancing awareness of alcoholism as a social problem have been emphasized. The major prevention-oriented emphasis has been an extensive media effort designed to reduce the problems of drunken driving. In contrast to the messages of these campaigns, however, alcoholic beverage commercials and advertising continue to use sophisticated sexual and peer pressure themes.

The 30- or 60-second public service spot on television, which is the usual format for messages warning of alcohol's dangers, has not proved to be a major influence on mores. Perhaps the potentially most powerful use of mass media to communicate alcohol-problem prevention messages is counter-advertising, similar to the mass media antismoking campaign. Also, the various communications tools used by the temperance and alcoholism prevention movements have an important place in a general strategy of persua-

sion. Prevention projects that use radio, television, and the print media are likely to achieve a greater effectiveness when combined with follow-up such as discussion groups, interpersonal communication, and community involvement. Although directing these campaigns is more arduous and less immediate than simply developing media spot announcements, the potential long-range benefits cannot be ignored.

Voluntary Organizations

Voluntary organizations in this country have a history of involvement in alcoholism prevention programs. The National Safety Council's "If you drink, don't drive; if you drive, don't drink" campaign was begun shortly after World War II. Other organizations mounting campaigns have included the National Council on Alcoholism, the National Congress of Parents and Teachers, and the Jaycees. Parents Without Partners, Boys Clubs of America, and others have begun in recent years to include alcohol education in their programs. The PTA and Boys Clubs of America have developed model projects for youth and youth-serving agencies.

Most prevention projects include a cooperative working arrangement with local voluntary groups, as well as with official agencies. In addition, many local voluntary groups may be identified as an important way to influence individual attitudes about drinking behaviors.

Alcohol Controls and Regulations—the Agent

Recent research has focused on the relationship of alcohol prices, consumption level, and the extent and distribution of problems in the general population. Many investigators have concluded that an empirical relationship exists between consumption level in a population, the prevalence of heavy consumption, and the rates of long-term health consequences such as cirrhosis.

Primary attention has been given to the effects of taxation and relatively high prices. Studies in other countries have suggested that alcohol consumption, like that of other commodities, is responsive to prices. Since World War II, alcoholic beverage prices in the United States declined relative to other prices, primarily because Federal taxes—a large part of the total price of alcoholic beverages—have not risen as fast as the cost of living. It has been argued by some that alcohol consumption might be stabilized by raising taxes to a level proportional to the rise in the cost of living.

Another area for concern is the legal lowering of purchase age. Since 1972, the trend toward granting complete rights to newly enfranchised 18- to 20-year-olds led to reduction of legal alcohol purchasing ages in most States. Experience in succeeding years indicated, however, a corresponding increase in alcohol-related driving accidents and fatalities among this age group. This has prompted a trend to raise purchasing ages for alcoholic beverages.

The arena surrounding legal control of alcoholic beverages and consumption is a controversial one and any major attempt at reform must be supported by careful research and evaluation. Up to now, most activities directed at the agent—alcohol—have been undertaken by industry or beverage control boards with little thought to possible health or social consequences. Constitutionally, the States, through their alcoholic beverage control boards, have the authority to govern sales of alcoholic beverages by establishing the minimum age of purchasers and the hours, locations, and numbers of outlets for sales. Research to assess the consequences of changes made by the States has been limited. However, due to the increased interest and the range of changes initiated, the time seems right for research and testing.

Some of the aspects relating to the "agent" that might be tested are

- enforcement of strict pricing policies;
- manipulation of taxes on alcoholic beverages to test decreased consumption;
- limitation of on-premise drinking;
- limitation on the number of drinking outlets by using zoning regulations to reduce the number of outlets in the inner city;
- reduction of the alcohol content in liquor;
- efforts to decrease the influence of advertising on drinking behaviors;
- increase in the minimum drinking age; and

- introduction of warning and ingredient labeling.

The Environment

Environmental approaches may focus on the setting in which drinking occurs, the conditions under which a person must function when intoxicated, and the cultural mores that influence drinking behavior. Research on preventive measures involving the drinker's surroundings has not been as extensive as work with individuals. Further experimentation is needed to determine how altering the drinking environment affects drinking behavior.

Modification of Drinking Settings

The physical properties of alcohol and its effect on the body underlie attempts to modify settings in which drinking takes place. Many believe excessive drinking and drunkenness result from hurried or tense situations, such as cocktail parties, in which alcoholic beverages are liberally available without food or nonalcoholic drinks. Introduction of sufficient amounts of food, promotion of nonalcoholic beverages, friendly conversation, and other means of reducing the focus on drinking could control the tendency to consume excessively. Several prevention programs, particularly among the college-aged, have used this type of modification with some success.

Insulating Drinking Behavior

Measures to insulate drinking behavior can be oriented toward physical, cultural, or temporal separation. Physical separation is the most obvious; for example, most States prohibit taverns within a certain distance of schools and churches. Cultural separation includes informal zoning policies that designate certain areas where drinking may occur. Temporal separation refers to measures that allow sufficient time between the drinking occasion and potentially harmful situations. Examples of temporal measures include ignition systems in automobiles that require mental alertness to operate, closing bars earlier during the workweek, and providing beds for intoxicated guests after a party.

Changing Reactions to Drinking Behavior

An alternative way of reducing some social problems related to drinking is to react less strongly. In some cases—such as a parent's panic over a drinking episode by a teenaged son or daughter—the reaction may be more harmful than the drinking itself. This approach has become possible primarily because the stigma of alcoholism gradually has been reduced. Alcoholics are being encouraged to seek treatment; and their families and friends are encouraged to treat drunken behavior as an alcohol, not a moral, problem.

Modifying the Consequences of Drinking

The occurrence and outcome of accidents often could be changed by a variety of environmental modifications. In this way, the consequences of drinking are challenged, without changing the drinking. For instance, intoxicated individuals are especially likely to benefit from automobile airbag crash systems, lowered speed limits, fireproof bedding, and from transportation provided for them or the need for transportation eliminated.

Influencing Cultural Mores

One of the most difficult areas for experimentation—but one with promise for possible long-range effects—is the attempt to modify the cultural significance of drinking. Sanctions on drinking exercise a great influence over the individual drinker and operate to establish a status quo within the community. Thus introduction of healthy drinking attitudes could go far to influence individual and group drinking patterns and behaviors.

Criminal Law and Police Powers

In recent years, the use of public drunkenness laws has been challenged by the alcoholism treatment movement and civil liberties groups. Because these groups consistently have urged treatment rather than imprisonment for intoxicated persons, decriminalization of public drunkenness has been Federal policy since formation of NIAAA.

As a relatively new area of criminal law, drinking/driving legislation has been researched heavily. Several studies have evaluated efforts to

increase the preventive effects of the law through stronger penalties or increased enforcement. In 1970 the Department of Transportation established local Alcohol Safety Action Projects (ASAP's), which operated in 35 communities across the country. Each program combined public information and education with countermeasures such as law enforcement and driver education. Although the initial evaluation showed that ASAP's had no significant impact on casualties, later studies have revealed that some of the projects had a measurable and significant impact.

Strategies for the Future

Many of the change measures suggested remain untested; also, the proper mix of strategies for achieving the most effective change under a given set of circumstances is yet unknown. Investigators in the prevention field must develop demonstration projects testing a variety of strategies to reduce alcohol-related problems.

Further emphasis, therefore, must be on experimentation within controlled settings that will allow the quantifiable testing of measures for change. An example of this type of project is the California Alcohol Problem Minimization Experiment.

This project—which is based on the general model of the Stanford University heart disease prevention experiment—involves selection of three urban areas, one for a media campaign plus intensive community and interpersonal efforts, one adjacent locality as a media "spill-over" area, and another area as a control without any unusual prevention or minimization efforts. Program goals for the prime area include increases in information about alcohol available within 1 year, changes in attitudes within 2 years, and changes in behavior and drinking problems within 3 years. This and similar programs should be studied and evaluated carefully.

Strategies for modifying attitudes and behaviors may overlap, or they may operate independently. However, to evaluate effectiveness, program goals and the strategies used to achieve them must be clearly defined. Changes in behavior must be capable of measurement in order to determine those strategies that have worked. Approaches are clearer when measures are aimed at modifying specific elements of the prevention model: host, agent, or environment.

Summary

- With the exception of programs directed toward teenage drinkers and drunken drivers, prevention traditionally has been seen as an effort to identify alcoholics early and urge them to enter treatment.

- Many prevention programs have no clear definition of what they are trying to prevent. The five general areas in which most alcohol problems fall should provide some guidance: chronic illness or disability and early mortality; acute health problems related to a specific drinking incident; injuries, homicides, suicides, and property loss during and after drinking; nonfulfillment of major social roles, notably those affecting family and jobs; and mental problems related to drinking.

- According to the public health model, problems are seen as stemming from an interaction among three factors—the host, the agent, and the environment. In dealing with the prevention of alcohol problems, the public health model becomes as follows: host (the individual and his or her knowledge, attitudes, and drinking behavior); agent (alcohol, its content, distribution, and availability); and environment (the setting or context in which drinking occurs).

- To date, much of the work in prevention has focused on the host or individual. Primary aims have included increasing knowledge about alcohol and its effects, modifying attitudes to support moderate drinking or abstention, increasing the individual's decisionmaking ability and interpersonal skills, building self-concepts, and modifying drinking behavior.

- The belief in education as a solution to social problems is longstanding standing in the United States. Although the evaluative literature has not demonstrated its effectiveness in changing behavior, alcohol education nevertheless is generally considered an important tool in preventing alcohol abuse.

- Alcohol issues have received considerable attention on television, radio, and in the press. Although the 30- or 60-second public service spot on television has not been a major influence on drinking behavior, counteradvertising in combination with followups such as discussion groups or interpersonal relations might be an effective way to modify attitudes and behavior. While directing these campaigns is more arduous and less immediate than developing media spot announcements, the potential long-range benefits cannot be ignored.

- Research is needed to test the effects on drinking behavior of modifying the content, distribution, and availability of alcohol. Some of the aspects that might be involved in this testing could include adjusting pricing policies, taxes, and zoning regulations, as well as reducing the alcohol content in beverages, and raising the minimum drinking age.

- Research on preventive measures involving the drinker's environment has not been as extensive as attempts to change the individual's drinking knowledge and attitudes. Further experimentation is needed to test the impact of such strategies as modifying drinking settings insulating the individual from the actual or potential effects of his or her own drinking behavior, changing reactions to drinking, modifying the consequences of drinking, influencing cultural mores, and applying criminal law and police powers.

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